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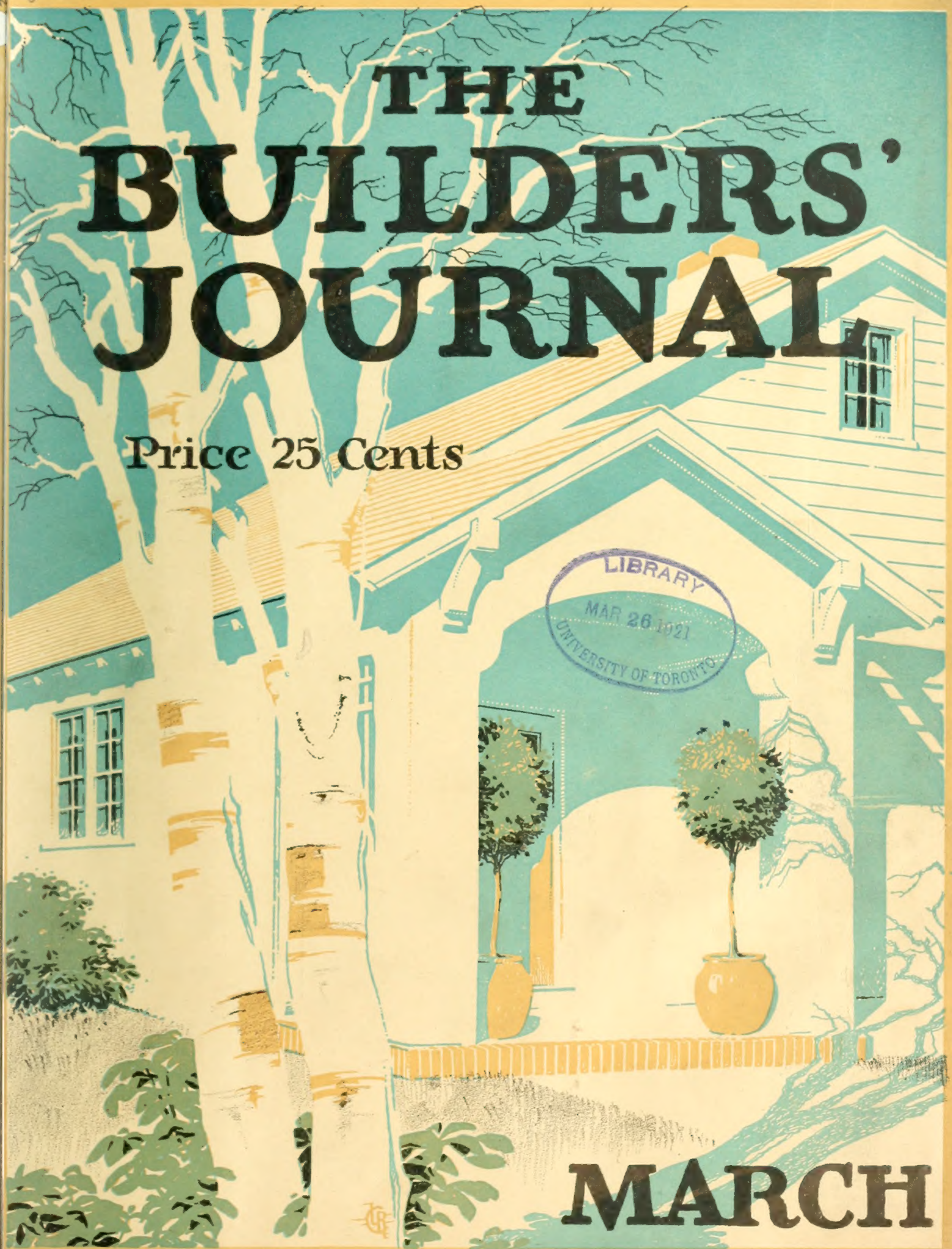
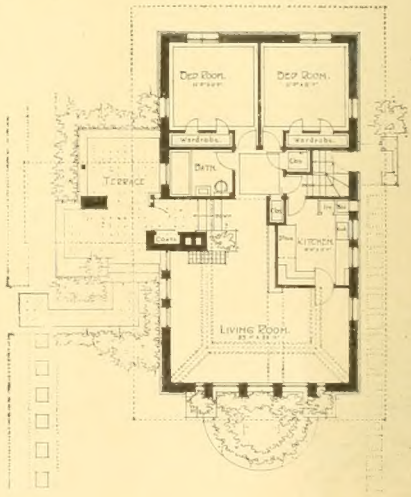


MARCH

Russell Barr Williamson-Architect
Milwaukee



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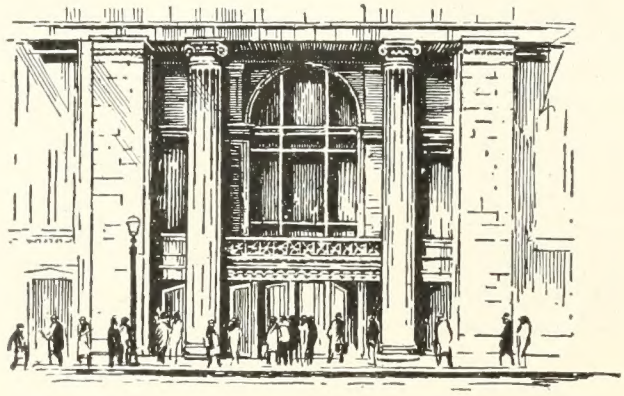

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Architects and Builders will be interested in two booklets prepared by the McKinney Manufacturing Co. One of these is on hinges for the home and the other pictures and explains hardware for garage doors of all kinds. Both these booklets will aid in selecting proper hardware to blend with architectural designs. These booklets and the McKinney catalog will be sent upon request.

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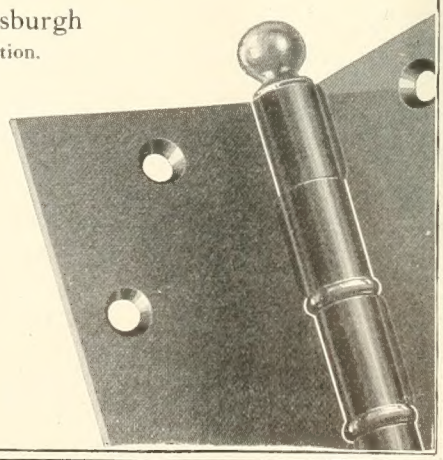


THE BUILDERS' JOURNAL

The Magazine of Better Building

VOL. II, NO. 3 MARCH, 1921

The Self-Made Optimist

THERE are two kinds of optimism.

One is of the stuff that dreams are made of. It is based on vague hopes and desires. It waits for the good things to happen. It is self-delusion. The other kind might be termed constructive optimism. It is possessed by the man who neither bewails conditions nor sits down to wait for better times. It is the essential spirit of those who see a distant but definite goal—who strain harder and more intelligently under adverse conditions. Someone has aptly termed them "peptomists."

Compare the feelings of those who wait for better times and those who "dig in" to make the times better. Both may be optimists, but which are more likely to realize the dream? The optimism of the latter class is based on knowledge of the day's work well done. These are the self-made optimists who do not wait and wail. They have increased the pressure. They perform the impossible. They do not recognize defeat.

Economists are struggling mightily to explain conditions in the building field. Some tell us that there will be a great slump in prices. Others, that we will not live to see pre-war costs. The fact is that there may be noted now an increased feeling of optimism of *the self-made kind.* Every wise individual is working harder, studying harder, wasting less time and less money. The haze and daze of war conditions are passing. The inflation of credit and currency, blamed properly for high prices, is being offset slightly by a noticeable inflation of harder work and effort by the individual.

The war workers are going back to the farms and incidentally to the building trades. Translating the term "increased efficiency of labor," we find naturally that the days of easy money are passing. They ought to pass. The paying of our war debt—the so-called deflation—is a personal problem. It means a greater contribution by the individual in work and common sense. It means that labor unions must return again to their normal, sound function of making certain that the laborer who is worthy of his hire is amply paid. The sane law of supply and demand is stripping the weaklings of false position. The real producer again will earn his rightful recognition.

This, then, is the day of the self-made optimist who bases his hopes on the work he does. As this spirit permeates every branch of the construction industry we may look for greatly improved conditions.

Are you making any contribution? If you have the "blues" about building conditions you are not! Hard work is the magic cure-all for worry—because it soon removes the cause!

Current Notes and Comments

Minnesota Building Employers Announce 20% Wage Cut

CONDEMNING the proposed statewide reduction of 20% in the wages of building trades as an effort to undermine the closed shop, union labor has served notice that it intends to put up a bitter fight against every reduction in wages that is not attained through collective bargaining.

Announcement of the decrease was made by the newly organized Minnesota Building Employers' Association, composed of employing contractors, who held their first meeting a few weeks ago in St. Paul. A statement issued by the Association defines the readjustment as an effort to stimulate the building industry and to restore the confidence of investors. Below is the new scale effective February 21:

Bricklayers	$1.00
Carpenters, finishing	.80
Hoisting engineers (10 hours)	.80
Teamsters (10 hours)	1.05
Iron erectors	.80
Cement finishers (10 hours)	.80
Building labor, skilled (10 hours)	.50
Hod carriers	.65
Plasterers	1.00
Lathers	.80
Plumbers	.80
Steamfitters	.80
Painters	.80
Sheet metal workers	.80
Electricians	.80
Tile setters	.80
Marble setters	.80
Roofers	.75
Stone setters	1.00
Stone masons	.80

Five-ton truck, $35 per day; 3½-ton, $30; 2½-ton, $25; (10-hour day), 6-day week, 8-hour minimum; ½-day, June, July and August.

Sound Advice from Los Angeles

SYLVESTER L. WEAVER, President Los Angeles Chamber of Commerce, makes these sound statements in *The Builders' Exchange Bulletin*:

"As for 1921, for the future, conditions are not favorable throughout the United States, but in our own section I believe that much depends on the industry itself as far as building is concerned. Construction work has been, to some extent, the barometer which shows the difference between good and bad times, and there is so much construction work to be done, especially in a fast growing section such as the great Southwest, that no permanent depression in building construction is possible. Nevertheless, I believe that in building circles this year economy and efficiency will be magic words, not only to building material firms and contractors, but to all their many men employed in the industry.

"The dollar is fast regaining its former purchasing power. Already it has increased in value and it should go further in the purchase of building materials and their construction into buildings during the new year. Hard work, diligent service and co-operative effort never yet hurt anybody. Men are happiest when they are working and giving themselves in full towards accomplishing any end. All of us associated together in building circles, in whatever sphere of development, should try our hardest during the new year to give an honest dollar's worth for every dollar expended."

Reduction in Building Costs Noted in Baltimore

BALTIMORE architects are working on an unusually large amount of work which may or may not be carried out in the spring. According to the better judgment of builders here there will be a considerable reduction in the cost of building by spring. If this belief is borne out by conditions at that time much of the work now in the architects' offices will be started.

In order to estimate what the reduction, if any, is in the cost of building in Baltimore at the present time, a number of estimates have been received from local builders. In one instance, involving a $50,000 structure, a reduction of between 20% and 25% was obtained during the past week as compared with an estimate on the same building taken a year ago. In the other instance, however, involving a $100,000 apartment house, the estimates of builders and subcontractors showed no greater reduction than about 5% over prices of last year.

Labor matters in the building trades are in very good shape in Baltimore. Aside from the asbestos workers, who threatened to strike several weeks ago, but who have since returned to work on former wages and without an agreement, labor is tranquil and apparently satisfied. Construction work in Baltimore is largely carried on under the open shop plan. (*H. F. Audoun, Baltimore, Md.*)

State Loans

IT is interesting to note that at last one state has taken very definite action in the matter of providing financing to meet the housing shortage.

A bill which recently passed the Senate and the House of North Dakota provides for an issuance, through the Rural Credits Board, of bonds to the extent of $3,000,000 for housing loans. These loans will run up to $4,000 and are made for a period of 12 years at a rate of interest not to exceed 1½% above the rate paid by the State on its borrowings.

Conditions in Central Massachusetts

PRACTICALLY all of the new building is confined to apartment blocks, dwellings and garages. Dwellings and garages lead in Worcester, Fitchburg, Webster and other towns and cities of Central Massachusetts. New garages of large proportions are planned or under construction in Worcester and Leominster. In Southbridge, it is planned to construct a large number of single dwellings on land owned by the Hamilton Woolen Co. Several new factories and additions are contemplated. Church construction, additions and alterations are confined to Auburn, Westboro and Worcester. In Whitinsville, it is planned to construct a $100,000 home for the Knights of Pythias.

In Fitchburg, the city plans to build a memorial home to cost $1,500,000 in honor of the soldiers of the world war. Worcester and Gardner plan the construction of new schools during the next year. Also in Worcester, where the big fire occurred recently, there will be expended about $3,000,000 in new up-to-date office and store buildings, also about $2,000,000 in new factory buildings and a 300-seat theater.

In Worcester there will be no demand for a higher wage among the carpenters, skilled building operatives or others. However, in Holyoke the bricklayers and plasterers have asked for $1.25 per hour, beginning April 1. In Central Massachusetts the carpenters, receiving $1 an hour, are satisfied. In Fitchburg, where the construction companies attempted to cut wages 10 cents an hour, strikes occurred. (*Leon J. Kreft, Worcester, Mass.*)

Boston Strike of Building Mechanics Still On

AFTER repeated attempts of the Mayor to arrange an agreement between the Employers' Association and the unions, the strike remains unsettled and is now in its second month. Practically all construction work is stopped, which includes two large buildings—the Federal Reserve Bank and an office building for the John Hancock Life Insurance Co. For the present there is perhaps no damage being done either party to the dispute because of the general inactivity that prevails in building. It is expected by many familiar with the conditions that if a satisfactory settlement is not reached by the time spring activity should start, the employers will declare an open shop.

Continued on page 50

Pelham Knolls, New York

A modern speculative development in which good design and construction help sales in spite of present conditions

Laurence M. Loeb, Architect; Herkimer, Inc., Builders

MOST builders are probably under the impression that unfavorable conditions of material and labor costs have stopped speculative building. While this is generally true in the case of the cheap dwelling, that formerly sold at a price around $5,000, it is not true in a very important field of speculative building—that for the business or professional man of comfortable circumstances who can pay from $10,000 to $20,000 for his home.

In view of the general conditions in the building field which have checked speculative home building in many localities, and the particular conditions that make a good development today, it will prove instructive to analyze various projects of this nature which have been successfully carried out in spite of conditions.

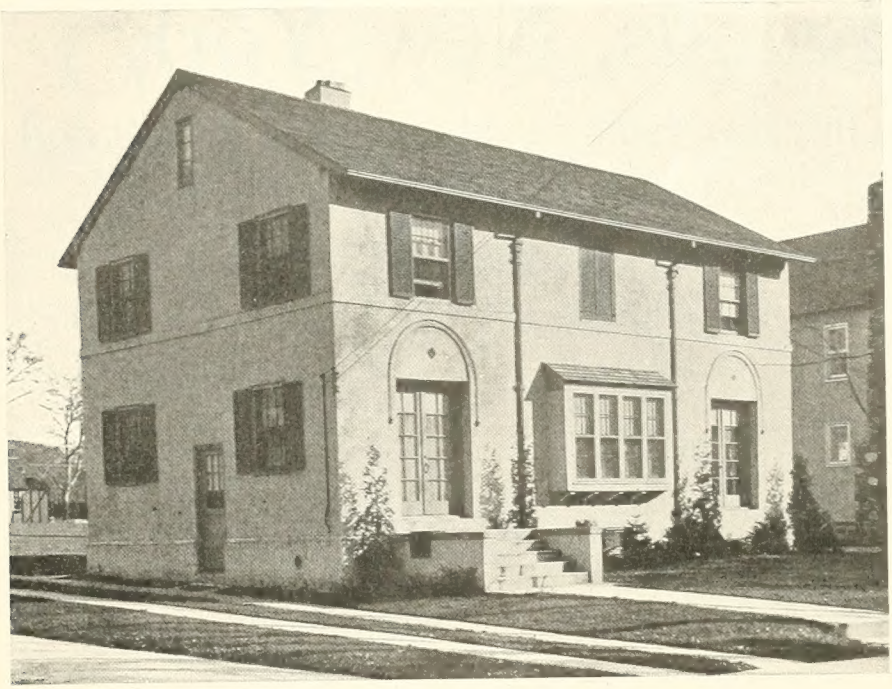
The illustrations shown here are of houses in a development a few miles outside of New York. They have just been completed and are now nearly all sold! That doesn't sound like impossible building conditions, buyers' strike or other excuses for doing nothing.

In July, 1919 the well known estate of Henry Iden in Pelham Manor, Westchester County, New York, was purchased by Herkimer, Inc., a speculative home building organization. This land was purchased for a development of high class residences to be known as Pelham Knolls, and Laurence M. Loeb was commissioned as architect to prepare plans for types of dwellings in the construction of which it would be possible to use various economical methods of production without sacrificing architectural merit.

Meanwhile, the plot of land, consisting of 15 acres, was carefully laid out with no building plot of less than a 60-ft. frontage. Streets were cut through and paved, and concrete sidewalks and gutters were laid in that section of the property on which construction was contemplated. Sewer, water, gas and electricity were also installed. Much of this development was carried on while dwellings in the first developed section of the property were being constructed. All of this development work was provided by Herkimer, Inc., and the fact that finished streets, curbing, sidewalks and other utilities were installed at the time the houses were completed and offered for sale was a big factor in securing quick sales and good profits. The cost of the development, of course, was proportioned to the various lots benefiting from it and was included in the sales prices. At the present time there have been completed 27 houses on this development of which a considerable number have been sold.

In examining the illustrations which accompany this article it will be noted that one of the methods of

Special care was taken by the architect to secure a development that would not be monotonous or "institutional" looking. The picture below shows how well he has succeeded



A straightforward house with stucco exterior which is dignified in appearance and economical in construction because of its simple lines. The plan is shown below

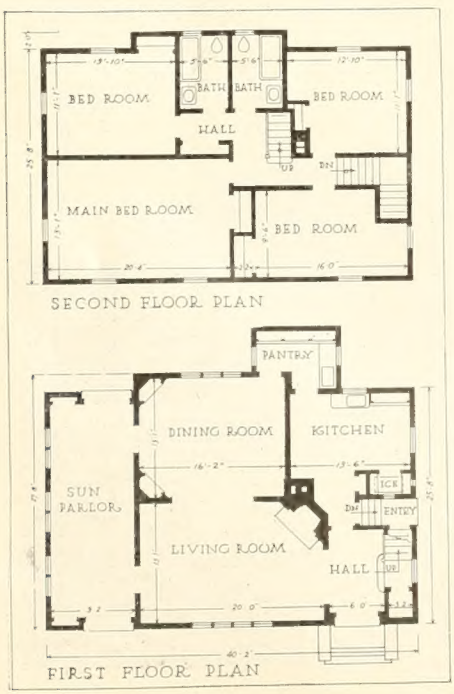
cutting the cost of production is to be found in a certain standardization of plan. Thus, two or three houses with entirely different or with dissimilar elevations were developed from the same floor plan with slight changes in some instances. The architect who designed these houses says that one of the main objectives of the design was to avoid the appearance, as far as possible, of a group development. It has been his observation that the average group development is likely to be monotonous and to have somewhat of an institutional air about it, even though the various details of the group might be entirely successful from an architectural viewpoint.

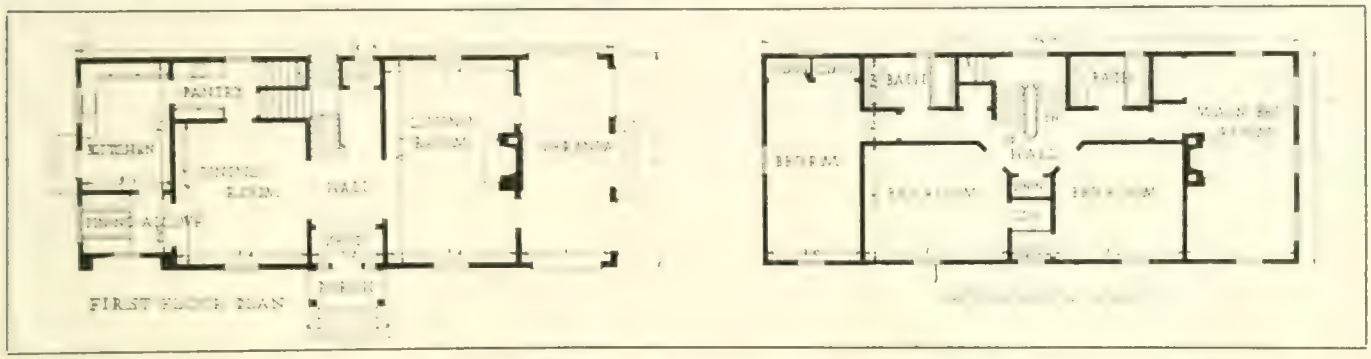
Those who have had experience in marketing dwellings will realize that one of the interesting points shown in this project is the provision of individuality without the introduction of any note of monotony or definite similarity which might be found objectionable by future purchasers of these dwellings.

All millwork for these houses is of standard type, furnished by a manufacturing organization which has been successful in combining the elements of millwork production and architectural excellence. The method followed in this operation was to select from a catalog of stock trim a very few types of windows, doors and trim. These types were established, as the architect says, as "our stock" and the necessary variety was secured by different methods of grouping in the various houses. One type of dresser was used throughout, also one type of interior trim for all but the service portions of the houses, where a simple sanitary trim has been introduced.

The trim used in these houses is but 3 ins. wide and has, according to the architect, a quality of distinction as well as less tendency to warp, shrink or open at the joints. In order to allow the use of the narrow trim on the double-hung windows, as well as of small mullions to get the effect of casements in rows of double-hung windows, a special type of sash balance was adopted. In the details, those incidentally which would attract the eye of the purchaser, such as entrances, mantels, stair railings and china closets, all possible variation within the established stock limits was procured in the course of designing. Such features as built-in

A variation in exterior treatment of the house shown above. This is designed along English lines and is conveniently arranged as shown by the plans at the left





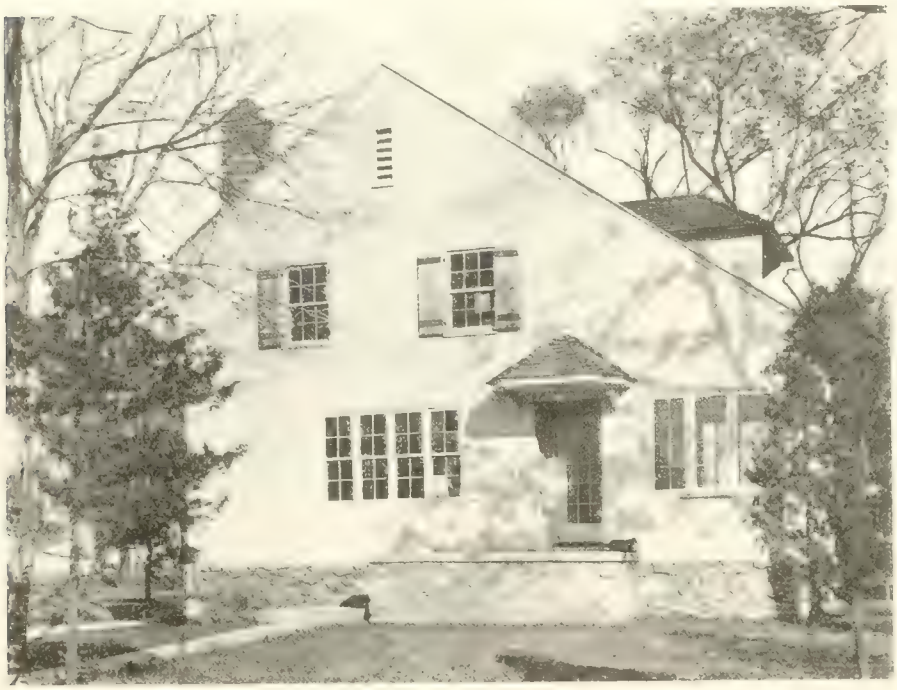
At the top of the page are shown two colonial houses built from the plans shown above. Reversing the plan and the change in roofs create houses of individual appearance

ironing boards and other modern kitchen conveniences were used.

It will be realized that these houses were built for sale and not as architectural masterpieces. The objectives included economy and efficiency as well as good taste. In order to further develop the valuable feature of variety in design various types of exterior structural materials were used; thus, some of the houses are built of brick veneer, some of stucco over frame construction and some of frame construction throughout with clapboarded exteriors.

Wherever possible false economy was avoided, however. For instance, it was found that for a very small expenditure, possibly an average of $50 to $75 per house, all main girders in the cellars could be constructed of structural steel. By so doing the possible shrinkage of the large depth of timber in wood girders was avoided, and the builders say that this precaution was of

Detail of entrance porch to one of the houses shown above. All finish used in these houses was selected from stock and shows the good character of material that is today placed at the disposal of the builder



Above is shown one exterior derived from the plan shown on the opposite page. It would take a trained eye to detect any similarity between this and the house on page 11

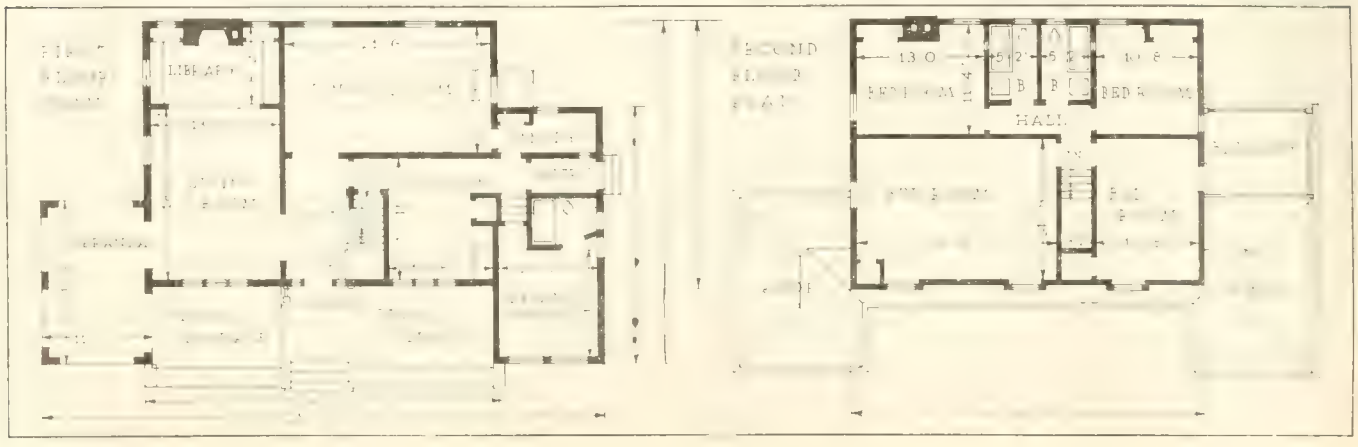
value in preventing plaster cracks. It is said, further, that after being built for over 1 1/2 years there are but two plaster cracks out of a total of more than 20 houses.

An additional expenditure of from $100 to $150 a house allowed the use of lead flashings throughout and copper gutters and leaders. In this way the use of the ordinary galvanized iron for leaders and gutters, which not only require upkeep in the form of painting, but often rust through rapidly, was avoided. The architect reports that this extra amounts to less than 3 years' maintenance cost of the usual flashings and gutters used in the construction of houses of this type, to say nothing of the amount saved in repainting costs. A special form of stucco which could be safely applied during freezing weather at small additional expense resulted in the gaining of several months in time of completion. Variety in color in the various houses was produced by the use of a dash in which different quantities of material were used to give varied surface texture and coloring.

In some of the houses, which were intended to be occupied by families that would probably have no servants, the usual butler's pantry between the kitchen and dining room was omitted so as to reduce the extent of travel between these points to the minimum, the dressers and cupboards being conveniently located in the kitchen. In the opinion of the architect the old theory that the pantry is needed as fortification against the smell of cooking is passing, the introduction of modern gas ranges with ventilated hoods serving this purpose in a more efficient and economical manner. The heating plants in these houses are equipped with thermostatic control apparatus.

The builders of this development say that they have had experience

In this house, with plans below, a servant's room over the garage was worked out by depressing the garage floor



in carrying out projects both with and without architectural service and that they find a number of advantages in building from architects' designs. In the first place, it is unnecessary to worry about the accuracy of plans and measurements, and in the second place, the ultimate purchaser of the house has the assurance that the work has been planned and checked by a skilled, trained architect.

The plan under which these houses have been sold has no unusual features. First mortgages were arranged with loaning institutions and, at the option of the purchaser, a second mortgage of the amortization type was executed in favor of the seller. These mortgages run in varying periods from 2 to 5 years. The range of selling prices of houses in this development has been from $18,500 upward.

From the development standpoint this project proves that there is distinct advantage in building houses before sales are made, for two particular reasons. First, the builder is in a position to deliver completed houses to purchasers for immediate occupancy and, second, the buyer is enabled to see exactly what he is getting for his money. He does not have to be able to interpret blue prints or run the possibility of misunderstanding provisions that are made in the plans with the result of being dissatisfied when the work is completed. It requires, on the part of the builder on the other hand, a thorough investigation of the requirements of the average purchaser so that the houses he erects will satisfy future owners

On this page are shown views of two houses that were built from the plans shown at the left. Note the variety in exterior elevations. The house above shows also an interesting use of simple window boxes as decoration

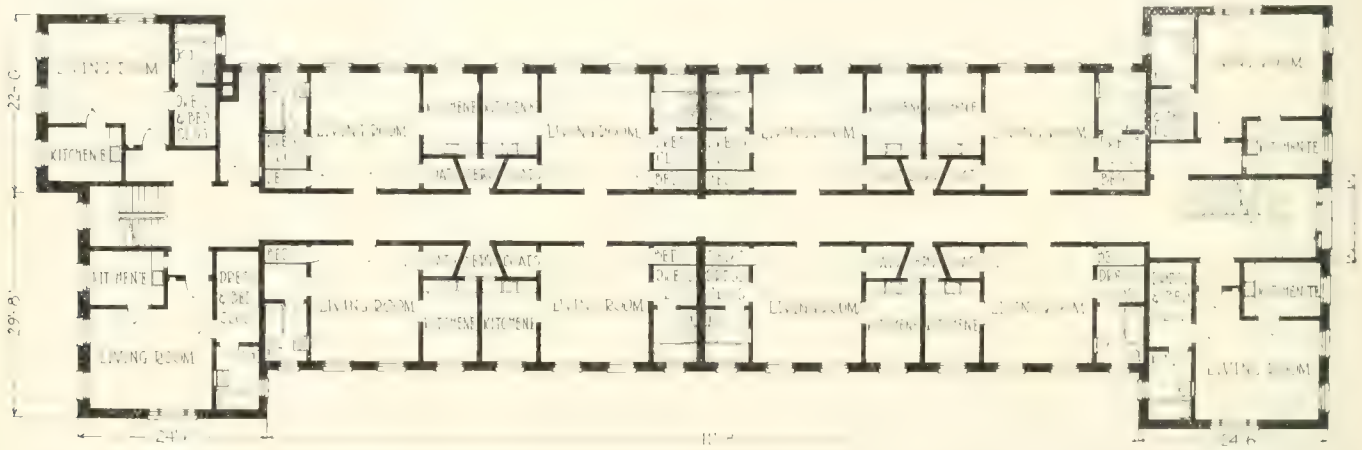
A Kitchenette Apartment House

This popular building at St. Paul, Minn., with single-room apartments produces good revenue

H. A. Sullwold, Architect

THIS building was finished in January, 1920 at a cost of $108,000 exclusive of land, or at a rate of 34 1/2c per cu. ft. Each apartment consists of one room, bath and kitchenette—the latter large enough for 6 people to dine comfortably. It is a popular type of building, that can be built at a profit today. The apartments are equipped with disappearing beds, refrigerators and gas ranges vented to a joint ventilator in the roof. Rooms are finished in ivory enamel with birch mahogany doors.

The mechanical equipment includes a return air line steam heating system, a 5-h.p. stationary vacuum cleaner with 2 outlets on each floor, 8 two-part laundry trays in basement, washing machine and mangle, with drying room, and an incinerator with a receiving door at rear of each floor. Such a building is economical in operation and if properly managed will be a profitable investment.



Above is shown the first floor plan. The second and third are similar with the exception of the entrance. There are twelve apartments on each floor and the owners have found through experience that there has been no demand for any apartments larger than those provided. The exterior is of red brick with limestone trim

"Daylighting" the Factory

Modern steel sash makes the alteration of poorly lighted factories simple and economical for builders

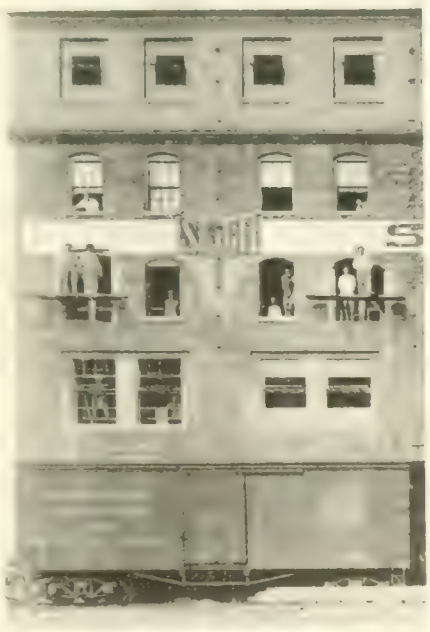
By F. W. Tufts

TRANSFORMING poorly daylighted factory buildings into modern industrial plants, so far as daylight and ventilation are concerned, is a problem that has been effectually solved by at least two nationally known concerns by the simple remodeling of their factory walls and using steel sash. So successful was such remodeling by the Studebaker Corporation, South Bend, Ind., and the Sligh Furniture Company, Grand Rapids, Mich., that scores of other manufacturers have followed suit.

In many plants built a number of years ago, when less attention was paid to engineering than now, the windows were made small with wide brick piers separating them which cut down the daylight and ventilation. Inadequate window space reduces the usable floor area, shortens the possible daylight working hours and runs up the artificial lighting bills. In other respects these buildings are well fitted for manufacturing and with the use of modern steel sash this objection to them may be easily removed. In addition to remedying the poor lighting, the substitution of steel sash for small wooden windows makes the building a great deal more resistant to fire.

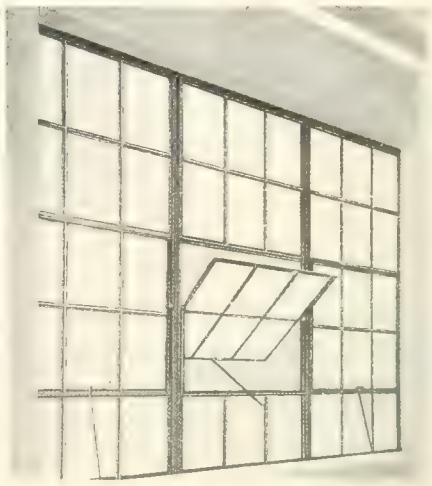
The Studebaker building, built a number of years ago, is 278 ft. long by 165 ft. wide, and is 5 stories and basement in height. The story heights are about 15 ft. from top to top of floors. The building has brick walls and plank floors, carried on ordinary beam and girder mill construction, and wood columns. The girders run crosswise of the building and the floor beams lengthwise. The longitudinal bays are 19 ft. 9 ins., and in the original construction each of these was provided with two window openings about 6 ft. wide with box frames, sliding sash and arched top. The tops of these windows were about 18 ins. below the bottom of floor beams coming next to the walls. Small brick piers, carrying no load from the floors, were built between the old windows. The width of the building (165 ft.) is such that, with the old construction, the center of the building was very poorly lighted and all manufacturing had to be carried on near the windows, using the central portion of the building for storage.

The Studebaker Corporation called on Lockwood, Greene & Co., Engineers, to provide means of securing more daylight. In the long sides of the building, for the first and second stories, the old wood



Above is detail of Sligh Furniture building showing old openings being enlarged and new lintels and steel sash installed

The Siewek factory shown below is a good example of the attractive appearance modern steel sash give to the small factory building



Steel sash can be used in large units and give daylight throughout the shop. The above factory shows the use of the sawtooth roof which provides additional light from above

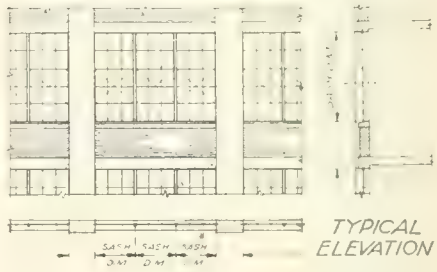
sash were removed, together with the small brick piers; the brick openings were carried up to the under sides of the floors above, new steel lintels were installed to carry the brick curtain walls between piers, and the new openings were filled with large steel sash windows. By this method, without weakening the building, 83% more glass area was obtained than was had in the old windows. The work was carried out, without interference with manufacturing, by the H. G. Christman Company, of South Bend. The cost of removing old sash and brickwork, for furnishing and installing new steel lintels and brickwork, together with all new steel sash, glazing, etc., was about $1 per sq. ft. of area for complete new windows.

As an experiment, at the Sligh Furniture plant in Grand Rapids, steel sash were used in the new fifth story addition to a 4-story building. Working conditions on the fifth floor proved to be so much better than on the lower floors, which had wood sash, that officials of the company took immediate steps to see that the entire plant was daylighted. Brickwork was reduced between window openings with an increase of approximately 15 sq. ft. more daylight area in each window. From a dark, poorly lighted and ventilated wing of the building, formerly used only as storage space, there was provided a well lighted structure, suitable for manufacturing purposes.

"We found our workers more satisfied, healthier and happier", said Mr. Sligh. "Where only a single line of workmen could work in the old building, we found it practicable to use double lines in the remodeled building on account of the improved lighting."

Factory buildings today must be equipped to allow the greatest efficiency to be had from the workers because of the high wage rates. Good lighting and ventilation are the first essentials; both of these requirements are easily met with steel sash, and contractors will find it profitable to familiarize themselves with this construction and to investigate the possibilities of modernizing old factories in their communities.

There is practically no limit in new construction to the size of window openings, in fact many modern railroad shops, foundries and other buildings requiring light over a large area of floor space have been built almost wholly of glass. This sash is made of rolled cold steel and it is self-supporting; it is not strong enough, however, to carry any weight of the building construction



Stock steel windows are arranged with sections to open for ventilation as shown by the above detail

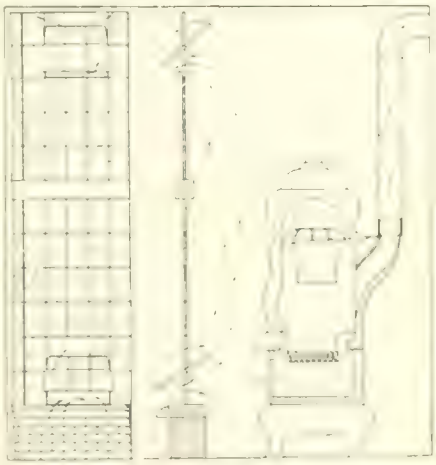
Opposite is a view in the Studebaker workrooms before remodeling. Note the darkness in center of room

and piers or columns and lintels of sufficient size must be provided for the frame of the building. In modern concrete construction, the wall space taken up by the frame is comparatively small and all the remaining space may be given over to window area, although in most factories a thin curtain wall is built under the sash to bring the bottom of the window to workbench height to provide room for heating pipes and wall radiators.

With these large areas of glass only part need be arranged to open. In many modern buildings where a system of forced ventilation is installed there are no openings in the sash, all fresh air being supplied by the mechanical system. In the average building natural ventilation is depended upon, however, and the arrangement of openings in steel sash is a great help in securing good ventilation. The part of the sash that opens is usually arranged on a horizontal pivot so that the sash swings partly in and partly out, giving what amounts to two openings which create a circulation of air. In bad weather the angle of the sash is adjusted so that rain or snow does not enter but the circulation of air is not interrupted.

In high storied buildings with large windows, two rows of openings are provided, one in the lower part of the window and the other close to the ceiling. This arrangement creates an excellent circulation of air similar to that passing through a stove. The fresh air enters near the floor and the foul air goes out of the building near the ceiling as shown in the diagram.

Exterior view of the Studebaker factory showing the new steel sash in the old walls which solved the lighting problem in this building



Steel sash with openings at top and bottom provide a circulation of air similar to that passing through a stove

Steel sash come in standard sizes to fit almost any character of opening, and it may be had with stock sections to provide almost any type of ventilation. The sash is also designed to take standard glass sizes and the glass is fitted usually into the frames by a spring clip arrangement to take up the vibration found in factory buildings. Hardware is made by the manufacturers of steel sash to meet the special conditions that are found in this type of window. In large installations of steel sash, where the openings for ventilation are placed near the ceiling, mechanical devices are arranged for operating.

Building construction proceeds rapidly from year to year with the perfection of new materials and equipment. There is probably no more striking example of the progress of modern construction than in factory buildings. Steel sash and the modern reinforced concrete frame, which allows the wall area to be greatly reduced, are the factors that have brought about this progress and the importance of builders knowing the details of this type of construction is clearly evident.

The view opposite shows the Studebaker workrooms after remodeling. Compare with picture on opposite page for amount of daylight

Automatic Temperature Control

Detailed discussion of modern devices for heating systems

By Maurice M. Osborne

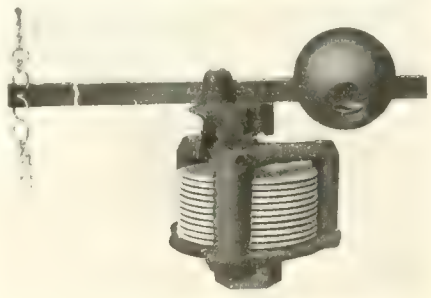
Monks & Johnson, Engineers

IN the simplest heating systems, hand regulation is employed to maintain approximately even temperatures. In the morning, when it becomes necessary to warm up the building for the day's activities, the fire is shaken down, drafts opened, and fresh coal added. The coal is quickly kindled and heat is supplied to radiators at a high rate until the rooms have been brought up to a normal temperature. The combustion is then reduced, by additional coal and the closing of dampers, to a lower rate sufficient to hold the rooms at a constant temperature. During the day occasional attention suffices to take care of changes of outdoor temperature. At night the fire is banked.

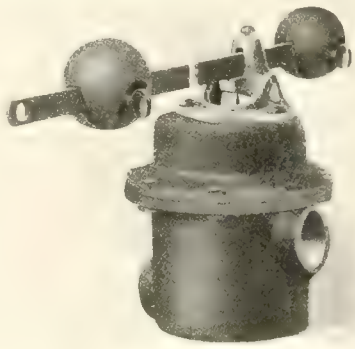
This hand regulation at intervals, however, is far from sufficient for maintaining uniform heat in all parts of a building. The entire time of one man is rarely given to a small heating system, and it is often the case that the furnace or chore man takes care of a number of buildings. A drop in outside temperature or a sudden cold wind may come between visits of the attendant. Before his attention can be given, the building has become chilled. The reverse may easily happen in the event of a quick rise in outside temperature. As a result, various automatic devices have been brought out, partially or wholly to obviate this necessity for constantly watching room temperatures and accommodating the rate of combustion in the boiler to them.

The automatic damper-regulator is the simplest type of such a device. In steam boilers the damper-regulator is operated by the pressure within the boilers themselves, arranged to open the dampers and to accelerate the combustion as the pressure drops below a certain fixed point, and similarly to retard the combustion in the event of the rise of steam pressure above normal.

The type of damper-regulation most used in small steam heating systems consists of a flexible metal bellows connected to the boiler through a small pipe with a short coil in it. This coil keeps the bellows full of water and protects it from the injurious action of live steam while allowing the direct action of the pressure on it. One end of the bellows is fixed, the other pivoted to a lever which amplifies its action. As the pressure in the boiler increases or drops, the bellows expands or contracts, moving the lever up or down. A chain attached to the lever and running



Steam boiler damper-regulator



Hot water boiler damper-regulator

over appropriate pulleys closes or opens a damper in the ashpit door and often simultaneously operates a check-damper in the smoke flue. One, and sometimes two, weights are clamped to the lever and are movable on it, serving to adjust the device to maintain any given pressure within its range. In some cases adjustable springs are used in place of weights to fix the point of regulation. Assume that 1 lb. pressure is necessary at the boiler to circulate steam throughout the system. By setting the damper-regulator to maintain a pressure of 1 lb. at all times, the system will operate thus:

With a sudden drop in outdoor temperature, the steam in the radiators will be condensed more rapidly than before. There will be a more rapid flow of steam to the radiators and as the boiler has been steaming slowly, the pressure in it will drop owing to the greater demand. The damper-regulator then operates, the dampers are opened, combustion increases in rate, more steam is made per minute, the radiators are supplied at a high enough rate to meet the condensation taking place within them, and equilibrium is established. The pressure in the boiler rises to 1 lb. and the damper-regulator then closes the damper and holds it there until another variation in outdoor temperature occurs. As the fire becomes clogged with ashes or clinkers the draft decreases, and the steam pressure drops. The regulator responds to this condition and takes care of it.

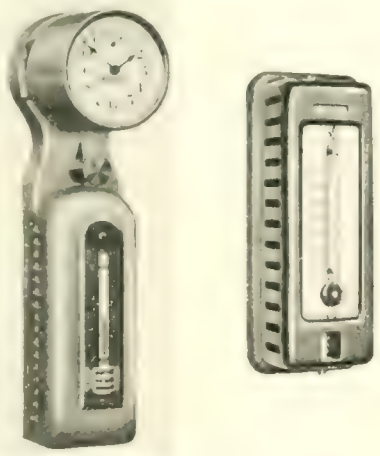
By changing the adjustment to maintain higher pressure, abnormally cold weather conditions may be met. If it is desired to check the fire at night, the weight is moved in to the limit of its motion, preventing the boiler from steaming at all.

There is no question that such a regulator pays and should be installed in practically every small steam heating plant, but it must be well put in, with a proper loop to prevent its direct contact with live steam, a good grade of chain running over easily moved and well laid out pulleys, and it must be kept in good condition.

For gravity hot water heating systems, a similar device is obtainable. In this case the metal bellows is filled with a liquid which vaporizes at a low temperature, creating a pressure thereby. The bellows is connected internally to a tube, also filled with the liquid, which is screwed in the boiler near its top. The top of the bellows is arranged with lever and weight exactly as in the case of the steam regulator. When the temperature of the water in the boiler has risen to the boiling point of the liquid, it vaporizes, lifts the bellows and lever, and closes the drafts. By adjusting the pressure on the liquid through the movement of the weight, the boiling point is changed and temperature regulation of the heated water is made possible with certain limits.

In buildings where the occupants themselves care for the heating systems and particularly in residences it is an awkward matter to rise in a cold room and proceed to the cellar and make adjustments to the damper-regulator. Some form of remote control is preferable. It is also true that the maintenance of a given radiator temperature during the day will not result, as a rule, in an even room temperature. Overheating is likely to occur in the middle of the day, and hand regulation must be resorted to. As we all know, this is usually not done, and the building is over-heated and fuel wasted. To meet these difficulties, simple temperature regulating systems have been devised, operated by, and responding to, the temperature of a room instead of the temperature of the radiators. The room chosen is usually the living or dining room, as being most important, but the coldest or most exposed room in the house may be chosen.

In this room is placed a thermostat, usually on an inside wall, and made on exactly the same principle as the damper-control device for hot water heating. This is adjustable from the outside, to respond to room temperatures between about 65° and 75° Fahr. If the room temperature rises above the limit set, the device expands and in its simplest form releases a catch on a small spring-driven motor contained in the same case. The motor, which must be wound up at intervals like a clock, turns a crank-arm within the case. Attached to the crank-arm is a cord extending through a small pipe down to the basement, where it runs over pulleys to the boiler dampers. The release of the catch allows the crank-arm to turn through one-half revolution, lengthening the cord and allowing the dampers on the boiler to close. As the room cools off the action is reversed. A connection on the cord or chain from the damper-regulator allows its independent action. In its simplest form it is necessary for the owner of the house to walk into the room where the thermostat is situated, in the early morning, and by turning the regulator arm to the hottest possible temperature bring up the fire and heat. When the room is warm enough the regulator hand is turned to the normal temperature for the day, which is then maintained. A more convenient arrangement includes a clock which can be



The thermostat at left operates a spring motor in basement by electric contact. At right is usual type of thermostat for individual room temperature control

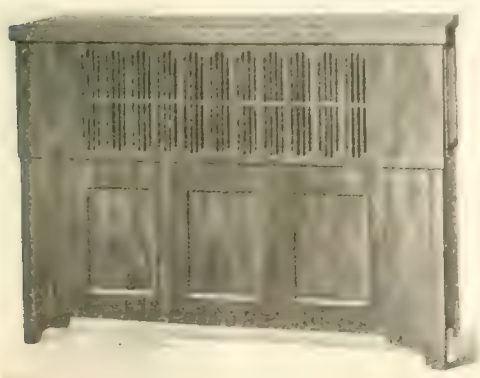
set to automatically open the drafts at any time in the morning and close them at night.

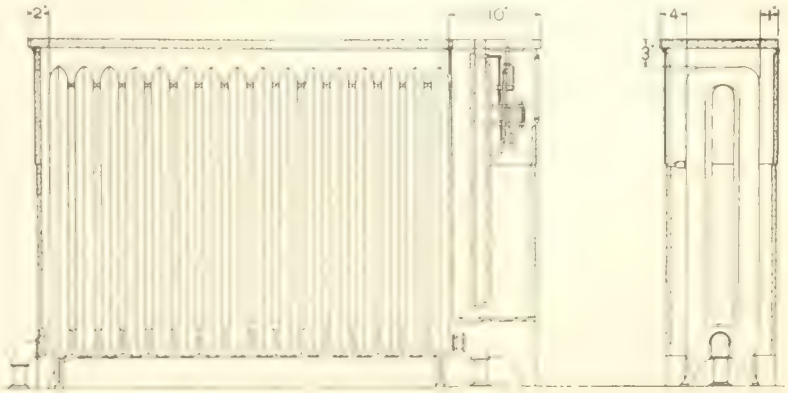
The simple thermostat, regulating the boiler fire by room temperature, is a decided advance on the damper-regulator only, but it has certain disadvantages. If it is necessary to keep the room cool where the thermostat is set up, then all other rooms in the house will be similarly cool, or if windows are left open in that room the rest of the building will be over-heated. Unless all radiators are exactly proportioned to take care of the several rooms, the controlling room may be properly heated, but others may be too hot or too cold. Cold winds from varying points of the compass may cause the same unevenness of heating. Of course, we can and do resort to a certain amount of hand regulation of radiator valves to make up for this deficiency, but a more perfect arrangement would be one which regulated the heat of each room separately and automatically without reference to any other room. This has been worked out in 2 different ways, either of which is more expensive than the simple thermostats just described.

One method consists of a radiator enclosure, which fits tightly around and over it on all sides. Small openings at the bottom admit air. At or near the top are openings fitted with small movable shutters exactly like those on certain automobile radiators. These shutters are directly controlled by a thermostatic device, again exactly like certain automobile radiator shutters, and large enough to move the shutters themselves. The thermostat is enclosed in the radiator casing but is insulated from contact with the air surrounding the radiator, and so arranged that room air may circulate through it. It can be set for any given temperature within the usual range. When this is exceeded the shutters are closed and the radiator is shut up in an envelope of hot air which cannot circulate. As the enclosure is lined with a non-conducting substance, no heat is given off under these conditions. When the room has cooled below the fixed temperature the shutters open again and allow a flow of air over the radiator and into the room, thus warming it up again. Devices of this kind are sold complete and can be applied to any existing heating system, throughout, or in certain rooms only.

The second method of individual room temperature regulation is

Below are the outside view and section of radiator enclosure with shutters operated by thermostat

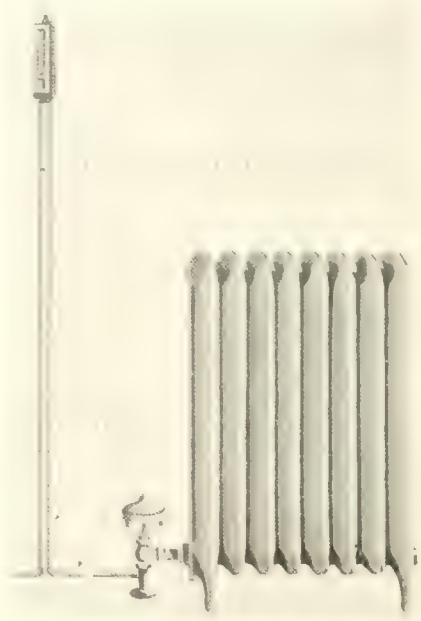




through individual thermostatic control of the radiator valves in each room. Rooms requiring automatic temperature control have placed on their inside walls thermostats exactly like those for single room control. But instead of operating spring motors, or closing electrical contacts, they open or close small compressed air valves. At some convenient point, usually in the basement, a water or electrically operated air pump and a compressed air tank are set up. An automatic regulator is included, which starts or stops the air pump so as to maintain a constant air pressure in the tank. The building is piped throughout with small size air piping, connecting all thermostats or radiators with the tank. This piping is built in the walls and floors, as far as possible, to conceal it. Each radiator has a valve normally held open by a spring. A metal bellows is arranged above it enclosed in a housing and operating a plunger. When compressed air is admitted in the bellows it pushes down the plunger and closes the radiator valve. An increase in temperature above that for which the thermostat is set, admits air to the bellows and shuts off the radiator. A decrease in temperature turns the radiator on. Any number of radiators can be controlled by one thermostat, but it is found best in practice not to control radiators too far from the thermostat, as such an arrangement is open to the same objections as a single room thermostat system with the spring motor. Therefore, in very large rooms, halls or auditoriums, it is best to use several thermostats, each controlling a group of radiators and regulating the temperature of a section of the room.

This last described method of control is the best and most flexible. It can be used in buildings of any size and is applicable to indirect as well as direct radiators. The installment and operating costs are of course the greatest of any method of temperature control. The air piping, valves, pump, motor and tank with automatic pressure regulation add materially to the installment expense. Electric current, or water, is constantly used to keep up the pressure. But such a system eliminates a very substantial waste of fuel. Heat is used only as needed. It has been the case that a large installation has paid for itself in a short time by coal saved, and even in a moderate size building the maximum of comfort is obtained so far as correct temperature goes. Every school of more than very small size should have such an equipment, in fairness to its pupils and teachers.

All of the systems outlined here are described as applying to heating by steam or hot water only. It is possible, however, to apply the single room thermostat to a hot air furnace as well as to a steam or hot water heating system. and it can be made to operate very satisfactorily



Arrangement of compressed air piping from thermostat to radiator valve

in this way. When the furnace is fitted with an alternative circulating connection on the cold air box, as described in the first of this series of articles, the damper controlling this action may be automatically operated through a thermostat, to mix the cold and circulating air always in such proportions as will insure even temperatures throughout the house.

Although the automatic attainment of an even temperature under all weather conditions contributes more than any other one factor to the comfort of the occupants of the building, the excessive dryness of all unhumidified air may cause no little discomfort even if the temperature is at 70° Fahr. Excessive evaporation will take place from the human body, causing dryness of mouth and nose and lowering the body temperature at the skin so much that a room temperature of 70° may not be warm enough for comfort. This is especially true on very cold, dry days. The cold, dry air outside may be at 10° and have a relative humidity of 60%. When this air has been brought into the building and warmed to 70°, the relative humidity will be reduced to 5.66%. As a result, the air is capable of taking up a great deal more moisture and does so whenever it can.

A properly designed hot air furnace with a water tank and evaporating surface will supply humidity to the air. Owing to the moisture evaporated in the heated furnace dome such an arrangement, providing there be sufficient evaporating surface and water supply, is inherently automatic in maintaining constant humidity in the building. But where ordinary steam heated indirect radiators are used, as in schoolhouses, it is not easy to apply this method, owing to the radiator enclosures. By careful planning, space can be left and water tanks installed. This should be done wherever possible, to increase room air humidity and promote the comfort of pupils and teachers.

In a room heated by radiators only, it is more difficult to introduce humidity. We sometimes hear people discuss the relative merits of hot water and steam heat, saying that hot water (being water) gives a "moister" heat. Just how this can be so is not clear, as the water (like the steam) is thoroughly confined within the radiators and piping. If it were to get out the owner of the house would be the first to complain. The same selling argument has sometimes been heard for so-called "vapor heat", which is nothing but low pressure steam heat. What is probably meant is that there is not so great an opportunity to over-heat with hot water or vapor as with high pressure steam. None of these systems of themselves add one particle of moisture to the room air, but the relative humidity may not be reduced quite so much by hot water or vapor heating as by steam simply because they are not as apt to over-heat, but on many days the humidity will be reduced more than it should be. If the radiator is set where occasional drops of water can do no harm, it is not a bad idea to leave an air valve partly open all the time. With this exception the only existing alleviation consists of various kinds of water containers to be hung behind the radiators. Some of these are made of tin and some of unglazed crockery. Those of crockery are the best, but are more easily broken. It is a messy job to keep these filled, but there is no other present way out of the difficulty.

Interpretation of Plans

Part III. An explanation of architects' scales with diagrams that make the whole matter clear

By Victor D. Abel

Boyd, Abel & Gugert, Architects

THERE are few more important details in connection with the reading of blue prints than to be able to understand the use of "scale", particularly as to the actual use of a scale to secure measurements and sizes where dimensions are lacking. In order to be able to read the plans it is necessary first to have some explanation of the reason for its use in the preparation of the drawing.

There are two primary reasons: First, in the study of the plan and design of any building it is necessary that the sketches (which are but pictures, developed by the designer's skill and imagination) be drawn to show the same proportions as those in which the building is intended actually to be built. In order to try to make it clearer to the student, let him reverse the process, reducing every dimension of the building, which we will consider already erected, in equal measure upon a small space, and this would produce the same result.

Second, it is absolutely essential in preparing the drawings which are to be used at the building by all mechanics for actual work of construction, that all of the dimensions surrounding the building, the sizes of rooms, the spaces and the sizes and locations of all openings, walls, mechanical features, etc., should be accurately drawn. This is in order to determine in advance of the start of work whether they will properly fit in the spaces within the building arranged for their accommodation, or within the walls which are provided for such features. Too often is this latter point overlooked and the drawing, which at first glance apparently is properly prepared to scale, will be found to have some fixture, wall or opening inaccurately drawn, making it impossible to carry out the plan as intended.

A plan thus properly prepared is not only easier to read, but shows at once the intention of the original designer to be carried out in constructing the building. As you become more familiar with drawings, it will be found that not only is a plan far easier to understand, but it presents, in addition, an appearance of intelligence. While it is true that we are not studying drafting, but only the reading of the plans after they are drawn, it cannot be too strongly impressed upon

Fig. 1.—Drawing of architects' scale showing scale of $\frac{1}{8}$"=1'-0"

the student that properly prepared plans and elevations are essential to the proper construction of a building and so should always be insisted upon. Practical experience, and that only, will soon prove the wisdom of this. Furthermore, the use of the scale in both drafting

Fig. 2.—Drawing of full size rule showing inches as laid off into sixteenths on standard rule and as used on drawings at scale of $\frac{1}{8}$"=1'-0"

and reading the plans is exactly the same.

The unit of scale used in this country for building construction, as for all linear measurements, is the foot which, of course, is divided into 12 inches. Therefore the same unit of measurement must be used for drawing the plan of the building in order to preserve the same proportions.

Before describing the different scales at which a drawing may be made, let us first study the indications which are used to show on a drawing the units of "foot" and "inch" and so avoid the necessity of continually writing them out at full length. This explanation belongs perhaps under the description of dimensions, but the two items are so closely related that it is given here as it is essential to an understanding of scale.

"Foot", or its plural "feet", is shown either by the letters "ft." or indicated by the single mark ′, which is similar to the degree mark in latitude and longitude. "Inch", or its plural "inches", is shown either by the letters "in." or "ins.", depending upon singular or plural, or indicated by the double mark ″ which is similar to ditto or quotation marks. Thus, 9 feet and 6 inches of length is shown either as 9 ft. 6 ins. or, when using marks, as is more common on plans, it would be 9′-6″.

When the distance is in even feet, it is usual to put "no inches" after the number of feet in order to make it clear that there is no figure missing; an even length of nine feet would be either 9 ft.-0 in. or, when using marks, 9′-0″. The dash used in connection with the figures is merely to separate them and avoid confusion, and thus simplify the reading.

The scale which is finally used in preparing the drawing of a building is generally governed by the size of the structure and the space in which it can be properly presented on a plan which is not too large for constant handling. A building one hundred feet (100′-0″) long would therefore be drawn 100 units in length, and it depends upon the scale selected for this particular plan what the actual size of the drawing would be.

In the case of a small building there is a good deal of latitude in the scale decided upon for the preparation of the working drawings, custom in the particular architect's

office often being the determining factor. It does not matter what scale may be used just so all of the essential information is clearly presented upon the drawings at such a size and in such form as to be readily understandable.

As the foot and the inch are the units used, custom has made the most common fractions, such as 3/4", 1/2" 3/8", 1/4", 1/8" and 1/16", the most used scales at which the various kinds of drawings are prepared. This means the lengths of the spaces or units on the drawing, each of which represents a length of 1 ft. in the actual sizes of the buildings when constructed. These, then, are the scales to be studied in their application to plans.

In a drawing on which is used any one of these scales, each unit must be divided into 12 ins., so that the inches as well as the feet may be properly shown, for more often than not a wall or partition is of less than 1 ft. while other spaces are very seldom in even feet. In the larger scales, such as 1/2" equals one foot and greater, the inch spaces are again subdivided into fractions of an inch, which are quite readable when the drafting has been properly carried out.

It will be found that in the majority of cases the scale which is used for working drawings is that in which either 1/8" or 1/4" equals one foot. To again explain: This means that every 1/8 in. or 1/4 in. on the drawing is supposed to represent a distance of 12 ins. or 1 ft. in the completed structure.

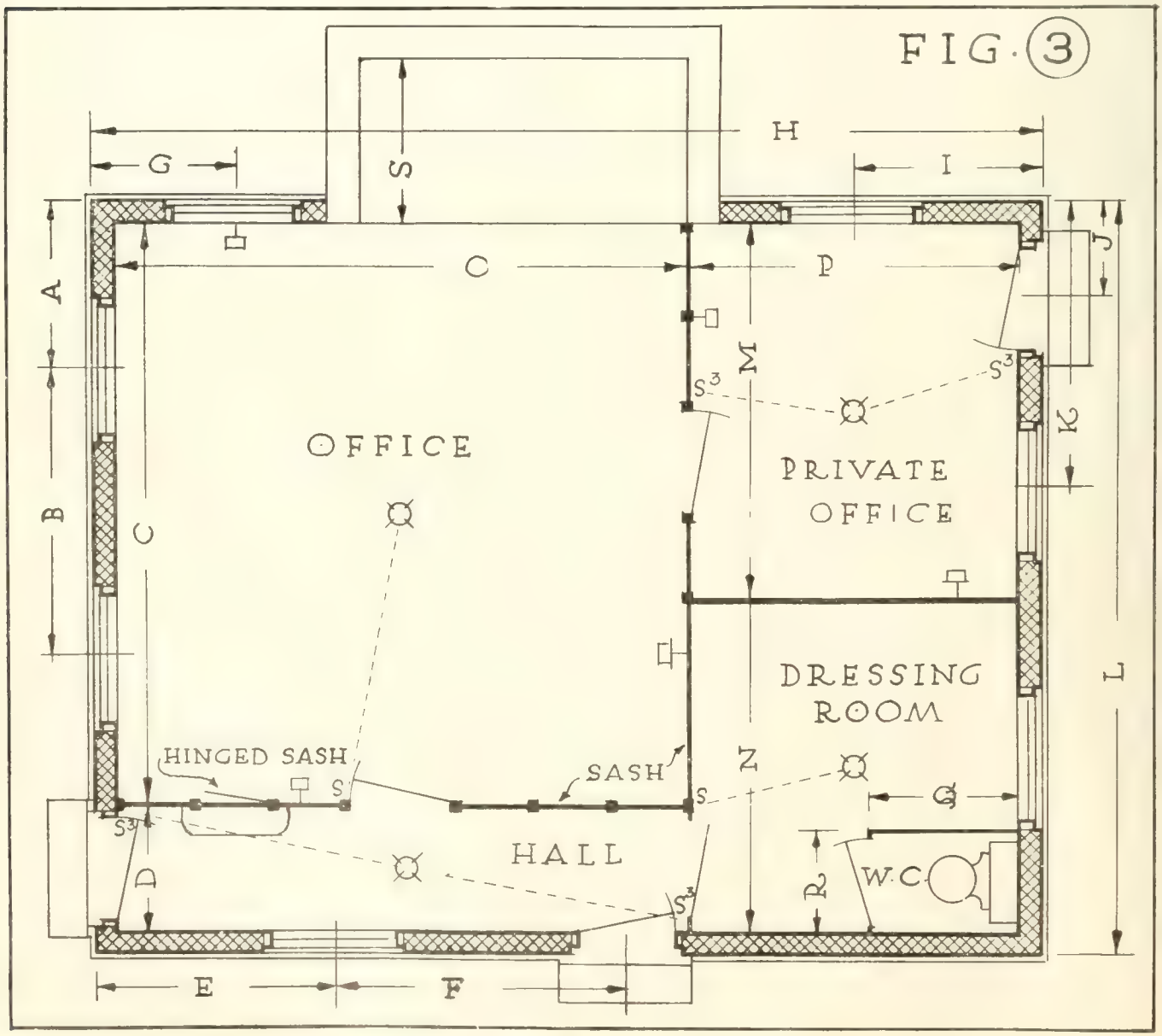
The usual "architects' scale", as it is termed, which is used in both preparing and in reading the plans, is so divided as to show the greater number of scales just referred to. Fig. 1 shows that portion of the rule on which the scale of 1/8 in.

FIG. 5

a—4′-1″	j—2′-4″
b—7′-1″	k—7′-0″
c—14′-2 1/2″	l—18′-6″
d—3′-0″	m—9′-1 1/2″
e—5′-10 1/2″	n—8′-1″
f—7′-1 1/2″	o—13′-11 1/2″
g—3′-7″	p—8′-0″
h—23′-3″	q—3′-8″
i—4′-7″	r—2′-6″
	s—4′-0″

To test your taking off measurements scale the various spaces on plan below and compare with correct figures above

FIG. 3



SCALE 1/4" = 1′-0"

to the foot is indicated. It will be seen that the first 1/8″ is divided into 6 parts, each representing 2 ins., for the convenience of the draftsman in his drawing and the mechanic in his reading. The other spaces are divided into foot lengths of 1/8″ and marked so as to be easily read. The drawing shows the scale alongside a wall which has been drawn to be 10′-4″ long, indicating the method of both drawing and reading the measurement by use of the scale.

This scale of 1/8″=1′-0″ (one-eighth inch equals one foot) has been used in the preparation of The Builders' Journal Working Drawings which are published in this issue, as will be noted by reference to them. Secure an architects' scale such as referred to, if you have not one already, and lay it along any of the walls or spaces which are dimensioned and check the figures on the scale with the dimensions given. Then try your scale on the spaces or walls not dimensioned, such as through the closet, linen closet, passage outside of bedroom, rear stairs and dining room, including exterior walls of the building and add them together. They should agree with the total of the 3 dimensions of 10′-6″, 3′-1″ and 11′-3″, through the bed-

[illegible] stairs and dining [illegible] 24′-10″

It is quite customary for the me[illegible] on the job to carry only a 2-ft. rule, so an architects' scale may not always be available. Every mechanic must have such a 2-ft. rule with him to lay out his work.

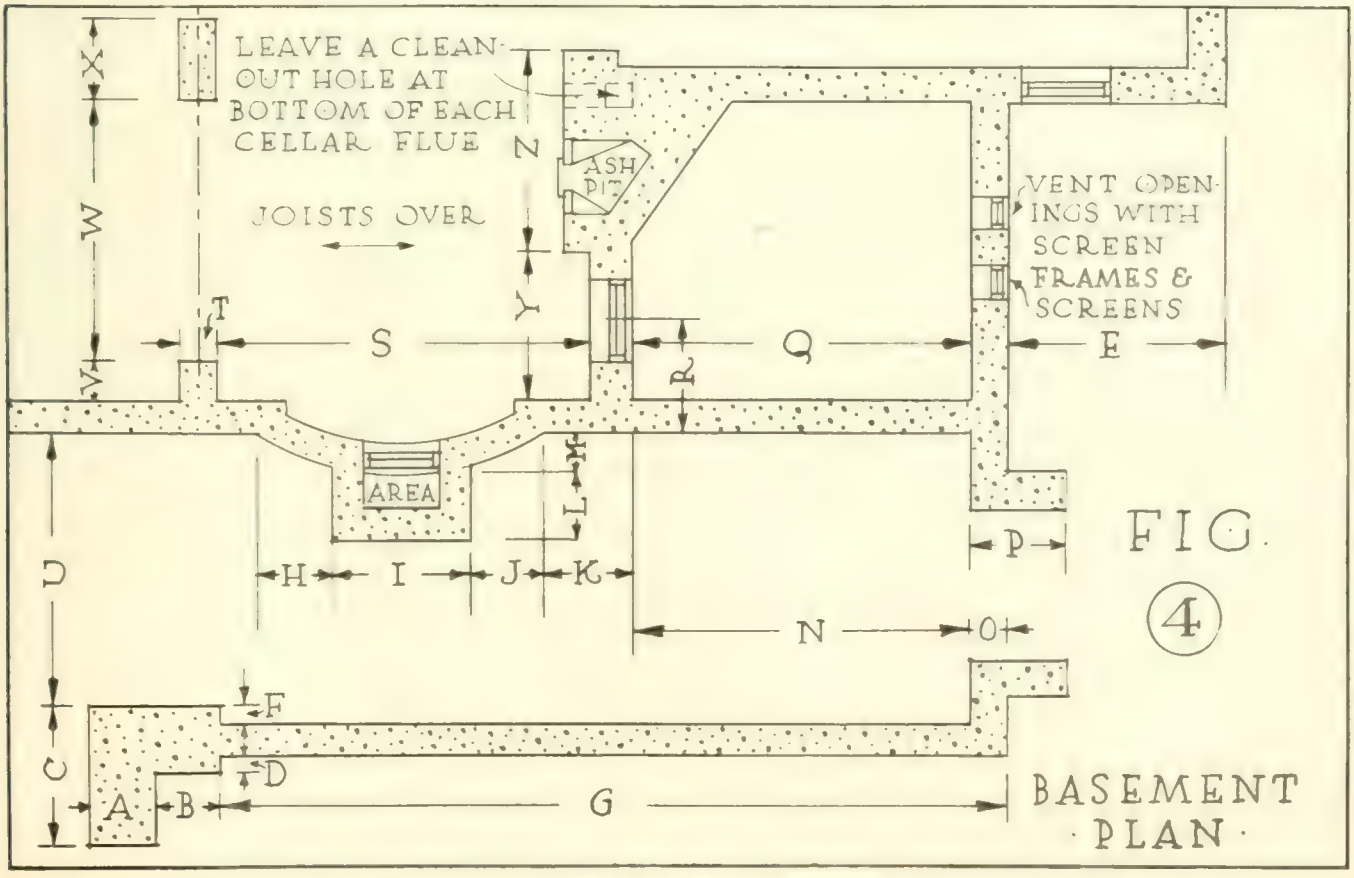
FIG. 6

[illegible] 2′-6″	[illegible] 14′-0″
[illegible] 2′-8″	o—19″
[illegible] 5′-10″	p—4′-0″
[illegible] 7″	q—14′-1″
[illegible] 9′-0″	r—4′-9″
[illegible] 0″	s—15′-6″
g—32′-11″	t—19″
h—3′-1 1/2″	u—11′-4 1/2″
[illegible] 5′-0″	v—20″
j—3′-1″	w—10′-10 1/2″
k—3′-9″	x—3′-4 1/2″
l—2′-10″	y—6′-2″
m—18″	z—8′-5″

Below is part of a basement plan at 1/8″ scale. Note many small dimensions. Scale and compare with figures above for accuracy of reading

which is always done at full size at the building. In such cases this 2-ft. rule is also used in reading the plans, where its use cannot be avoided. Except for checking dimensions or for rough sizes of spaces, the measurements shown by such a rule should never be accepted as final. In all cases a definite dimension should be used where possible, and if not, the plans should be read with an architects' scale divided off properly into feet and inches, as at the scale of 1/8″ to the foot the thickness of a line may mean a difference of several inches to the untrained eye. This is particularly true in the locations of openings which are often, from this cause, wrongly placed. Furthermore the paper on which blue prints are made often expands and contracts, which is another reason for the use of dimensions where possible, rather than measurement by scale. This is often the reason for a seeming inaccuracy in drafting, rather than the fault of the draftsman preparing the drawing.

For the convenience of the mechanic, if he should have to use his full size rule, these simple instructions may be observed. It will be found that such a rule is usually divided into sixteenths of an inch and it is therefore possible to read



to each 6-in. space at a scale of 1/8″=1′-0″, every 1/16 being equal to 6″ at that scale. See Fig. 2 and read also the Journal Plans. Where 1/4 in. to the foot is the scale of the drawing, each 1/4″ on the rule represents 1 ft. of length, and the rule being divided into sixteenths, each such sixteenth represents one-quarter of a foot or 3 ins. of the scale.

These are the two most important scales in the reading of drawings and considerable time has been devoted to making them clear, as it is important to become thoroughly grounded in their use. In addition to reading the scale from the Journal Plans, study the two parts of the floor plans here presented in Figs. 3 and 4. Fig. 3 is the ground floor plan of a small, hollow tile, one-story office, and Fig. 4 is part of a basement plan showing the stone foundation walls of a large house. With the aid of your scale or rule check off the spaces marked a, b, c, etc., and then compare them with the lists in Figs. 5 and 6 to see if you have them taken down correctly. It is easy to make an error of an inch or two at this small scale, depending upon the thickness of a line as well as accuracy in the implements used in making the drawing, and then again because of the action of the blue print paper. This establishes the necessity of the dimension line being followed wherever it is given instead of trusting to scaling off spaces with the risk of error.

In addition to the scales used extensively in the preparation of the working drawings of a building there are, of course, the other scales referred to previously as being used for the drawings of portions of buildings and for other purposes. For rough sketches, such as preliminary studies of the plans and elevations, often 1/16″ and sometimes even 1/32″ scale can be used where it is desired to study a building in plan and design without detail. This makes it possible for the plans and elevations to be rapidly drawn at a scale which is small enough for rapid sketches and yet large enough to study the proportions of the elevations and determine the layout of the plans. As they are seldom in evidence at a building, being only used in architects' offices for purposes of design, they are merely mentioned in passing to familiarize the student with them and need not be taken up in detail.

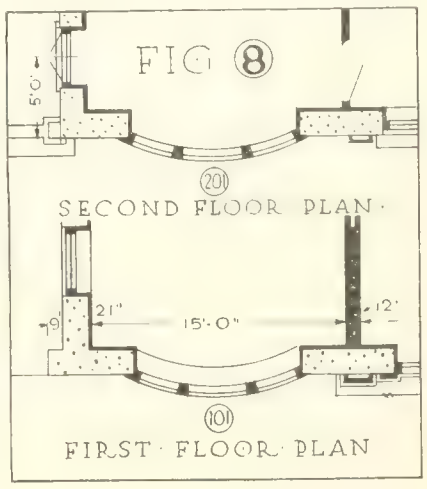
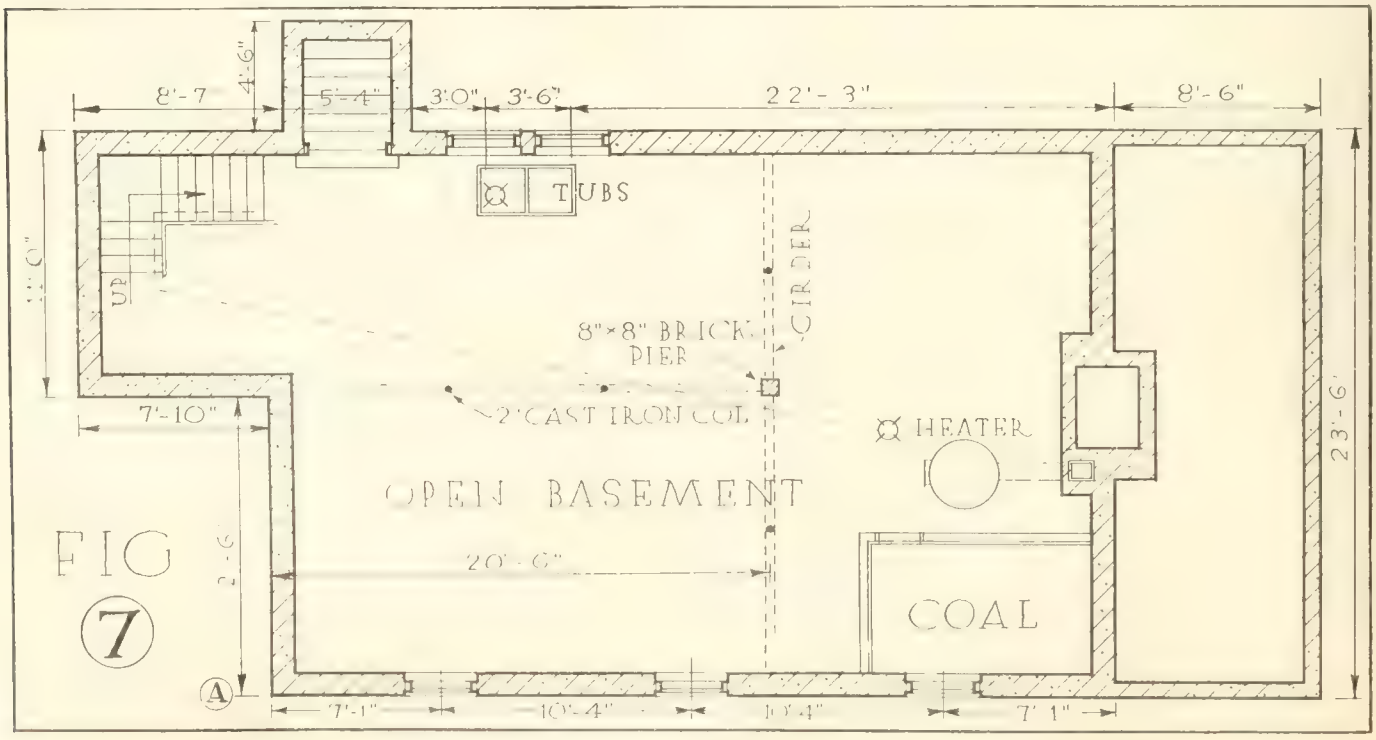


Fig. 8.—Plan of 2-story bow window. Figures omitted on second floor to show window centers over one below

After the working drawings of a building have been completed, it is generally necessary that certain of the openings, exterior and interior finish, stairs, cornices and other important architectural features be drawn at a larger scale. Such drawings should be very carefully made as they must accurately show in their proper sizes and relations to each other the various contours and mouldings, and the joining together of the parts that go to make up a complete detail. These are known as the detail drawings, as has been explained in the first article of this series, and in order to be easily read, they are drawn to a larger scale than is used for the working drawings.

Scales varying from 3/8″ to 3″ to the foot are used for such detail drawings, depending upon the size of the detail and the number and arrangement of parts which may be required for its proper presentation. Generally 1/2″, 3/4″ and 1″ to the foot are the scales used, the two former being perhaps most in favor.

For the mechanic at the building, the 3/4″ scale is perhaps the most



SCALE 1/8″ = 1′-0″

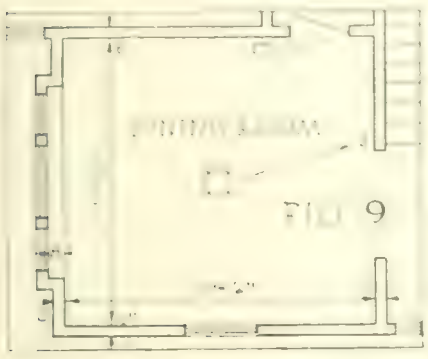


Fig. 9.—Plan to show method of figuring to plaster face of walls

1/2″=1′-0″ see the details on Sheet No. 1 of the Journal Plans. Here, where there are no dimensions given, the student can apply his scale or rule and check up on all of the sizes and measurements as just explained for the other drawings. Compare these large scale drawings with the 1/8″ scale working drawings and the method of and reason for the presentation of details can be quickly seen.

This detail drawing at a larger scale than the working drawing also, incidentally, illustrates the clause usually a part of the general conditions of an architect's specification, which says "Follow Larger Scale Drawings." This means that wherever a detail drawing of a part of the building is made at a large scale, such larger scale is the one which must be followed in the construction work at the building.

The reading and the understanding of scale is closely allied to the dimension lines on a drawing. It has already been explained that the shrinkage or expansion of blue print paper affects the accuracy of the measurement by scale. Therefore the importance of using dimensions where given, instead of trusting to the use of any kind of a rule or scale, no matter how accurate, cannot be overestimated.

It would seem to be easy enough to put on a plan all of the dimensions and lines necessary to cover every conceivable space, thickness of wall, location and size of openings, etc., but the more unnecessary dimensions placed on a drawing, the more chance there is of error in checking or in inking them in. It is not so much the number of dimensions required as it is to have just enough and no more, so as to make the reading of the plan easier, rather than make it more difficult by a complication of lines, notes and figures. Furthermore, it is sometimes impossible to dimension sizes until detail drawings of the necessary parts of a building are prepared.

Dimension lines are usually placed on drawings with a diluted black ink or with a thinner line than that used in the rest of the drawing. This is to avoid confusion with the lines of walls, partitions and constructions. See Figs. 3, 4 and 7 and Journal Plans. The points to which dimensions are taken are indicated by arrows at the ends of each line having a dimension. In order to make the figures legible on a drawing, and to avoid confusing them with the other lines, they are often placed away from the point to which the dimension applies and another line drawn from the point across the dimension line at which the arrow is placed. This is a mechanical device which is common to all drawings and will be found in all of the illustrations in the article.

Dimension lines should always be worked out and therefore should be read from specific points or from the centers of buildings, rooms or spaces wherever possible. This should be always kept in mind when locating walls, openings or other features by measurements or dimensions, as it will simplify the laying out of the work at the site.

First of all, in reading the dimensions on a plan and then in laying out the work, start with a fixed point at some corner. All dimensions can then be laid out from this basic point, except, of course, any minor dimensions of openings, interior partitions, walls, fixtures, etc. To illustrate, Fig. 7 shows the basement plan of a small building, properly dimensioned. Beginning at the corner at A, the first wall dimension is 12′-6″ to a corner. From this point the next section of wall to the left is 7′-10″ to another corner. Thence to the rear 11′-0″ to another corner. These dimensions of walls can be so continued around the entire building, establishing each corner or break as the basic point. With these fixed points established, all of the other dimensions to centers of openings for thickness of walls, or for other necessary measurements should be worked out beginning at each corner at which such dimension starts. As an instance, having established the point A in Fig. 7, the centers of the openings in the front wall, which are 7′-1″, 10′-4″ and 10′-4″ again can be established and the frames for the windows set.

Where there are no dimensions on a drawing, they may sometimes have been omitted because the center of an opening is in the center of a room or space, or perhaps over the center of an opening below or above on the plans. The careful mechanic who has become familiar with his plans by studying them thoroughly will at once note this. It has been found better to follow the dimensions to the center of an opening below in locating an opening in an upper story directly above the first, such as may be seen in the two parts of first and second floor plans in Fig. 8 showing opening 201 directly centered over 101, than to duplicate the dimensions on each floor plan and thus increase the chances of an error either on the part of the draftsman making the original calculations or the more serious error on the part of

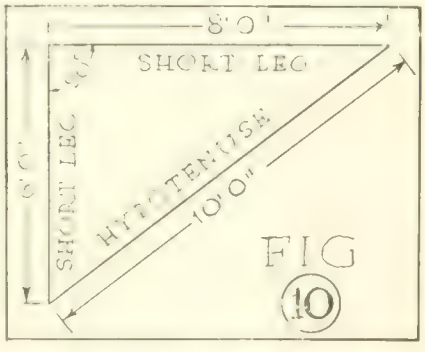


Fig. 10.—Method by triangle of getting right angle in foundation layout

the mechanic laying out the work. It is astonishing how readily one can err in calculating the measurement or in applying the rule while at work at the building.

The method of the dimensioning of interior partitions varies. In some cases they are given to the center of the partition, as in the Journal Plans, and in others to each side as in Fig. 9. It is a much disputed question which is the better. In the first case the thickness of partition must be given at some point or the size of studs specified so that the work can be properly laid out and the proper room sizes

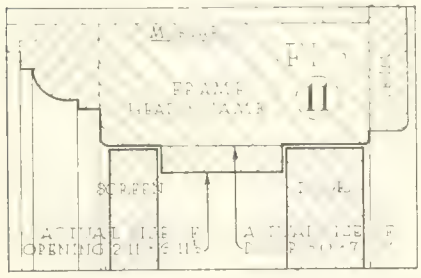


Fig. 11.—Detail of door frame showing points to which door sizes and actual openings are figured

secured. To do this the thickness of partition must be obtained and subtracted from the dimensions given. In the second case, the exact room sizes and the thickness of partitions are given at once in the dimension; but the mechanic must be careful in laying out the work to properly place his studs in the center of the partitions.

Dimensions of heights in the building should always be taken from the floor lines. It is usual to dimension from floor to floor, instead of from floor to ceiling, for the exact ceiling height of different rooms in the same building may vary, due to varying sizes of joists, which are based on the length of spans, or in some portions of buildings thinner floor slabs may be possible than in others, etc. Note the floor heights dimensioned on Sheet 3 of the Journal Plans as an illustration.

All dimensions, whenever and wherever used, should always be checked up. This perhaps does not properly belong to the reading of the plans, but it is a part of the duties of any mechanic who is laying out work. It is essential, just as are some of the other points which have been mentioned from time to time. All figures should agree in the totals from the fixed points of a building, when checked in any direction.

In connection with the subject of dimensions and reading them properly and then in laying out the work on a building, it would be perhaps the right time to explain how simply the corner of a building having the walls at a right angle of 90° to each other can be accurately laid out so that they will be perpendicular to each other.

This is done by laying out a triangle in which two sides are 6 ft. and 8 ft. and the other 10 ft. See Fig. 10. The 6- and 8-ft. sides form the right angle at their intersection. This is simply an illustration of the doctrine of geometry that the sum of the squares of the two short legs of a right angle triangle is equal to the square of the hypothenuse. To prove:—add the square of one short leg, 6, which is 36 to the square of the other short leg, 8, which is 64 and this total is 100, which is equal to the square of the hypothenuse of the triangle, 10.

Generally speaking, the majority of buildings are carefully designed to have rooms or spaces with walls at right angles to each other, and all vertical members upright at an exact angle of 90° to the horizontal plane. Openings, features, spaces, etc., are usually again divided into centers from walls or other fixed points. Note that in the Journal Plans the fireplace in the living room is in the center of the room, the dining room bay in the center

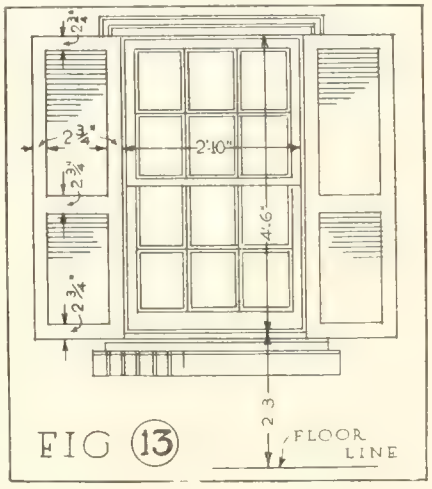


Fig. 13.—Sash size and sill height as shown on elevation drawing

of the room, etc. There are, however, certain types of buildings, such as English country houses, where often the openings and even the walls and other portions are not only not at right angles, but are deliberately off center. Also, quite often a building must be fitted to a property the outside lines of which are not at right angles and the building is therefore arbitrarily laid out in accordance with the lot lines.

When it comes to the dimensions of details care must be exercised to be sure to have the dimensions taken to points intended. For instance, door sizes are the exact size of the door itself, but the clear size of opening in the frame is less the width of the projection of the rabbet on each side and on the top. Therefore a 3′-0″ by 7′-0″ door, in a frame with a 1/2″ rabbet has a clear opening of only 2′-11″ by 6′-11 1/2″. See Fig. 11.

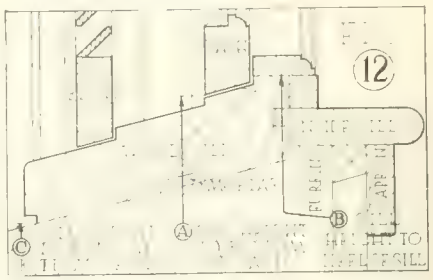


Fig. 12.—Detail of window sill showing different points to which sill height is figured

Windows are generally dimensioned as sash sizes, without the frame. See Fig. 13. The size of the opening in the exterior wall to receive the window is therefore governed by the kind of window, whether double-hung or casement, and by the size of the sash and the thickness of frame detailed.

The dimension for the "sill height" of windows, or the distance from the finished floor line to the sill, varies as to the point to which it is dimensioned. This should be secured from the detail drawings. Sometimes it is taken from the bottom of the sash. See Fig. 12 at A. Sometimes from the "heel", as it is called, of the sill as at B, and perhaps from the point of the exterior sill as in C, depending entirely upon conditions of design and arrangement. Note that the windows in The Builders' Journal Working Drawings are figured to the top of the sash, which insures the heads being on the same line. In a complicated building where there are both kinds of windows and various sizes of each, care must be taken by the mechanic that he understands the point from which each height is taken, as often it is required that heads or sills line up with those of another opening on the exterior or interior and in these cases the sizes of sash or other dimensions may vary in order to carry out the proper design.

In familiarizing yourself with the plans, the construction and the many other details of a building before starting its erection, make sure also that the dimensions are entirely clear. In an article such as this attention can only be called to the necessity of following them, for the figures of the dimensions themselves can be easily read and, this done, the only proper interpretation of the plans is in seeing that they are followed. For this reason the necessity of accuracy and care is being impressed always as strongly as possible.

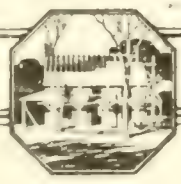
THE BUILDERS JOURNAL PLANS

A Series of Practical Designs for Small Houses Published in Complete Working Blueprint Form with Quantity Survey of Construction Materials Needed for Estimating Purposes

NUMBER ELEVEN

A FIVE-ROOM BUNGALOW

Designed by
GORDON ROBB
Architect for THE BUILDERS' JOURNAL



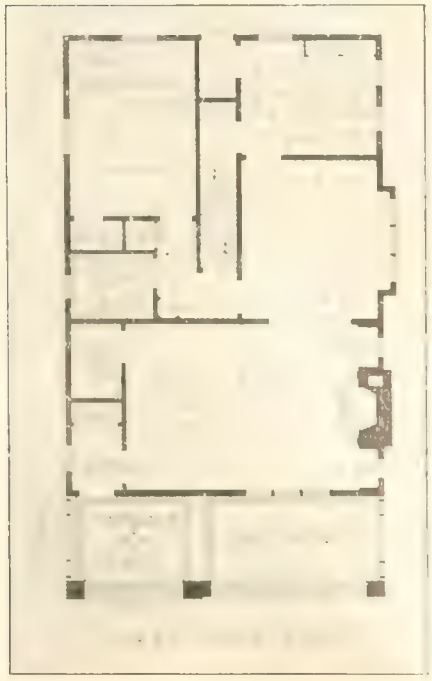
THE market for the small house with a convenient plan for easy housekeeping is growing steadily and the builder who is able to meet the many demands for it in the next few years will be both busy and prosperous.

THE BUILDERS' JOURNAL has been giving a great amount of study to the problem of the small, economical house and we present in this issue a plan that shows an attractive exterior and a very convenient arrangement of good sized rooms that should solve the problem for many builders. This house is included in a simple rectangle without any breaks, 25 ft. wide and 36 ft. deep.

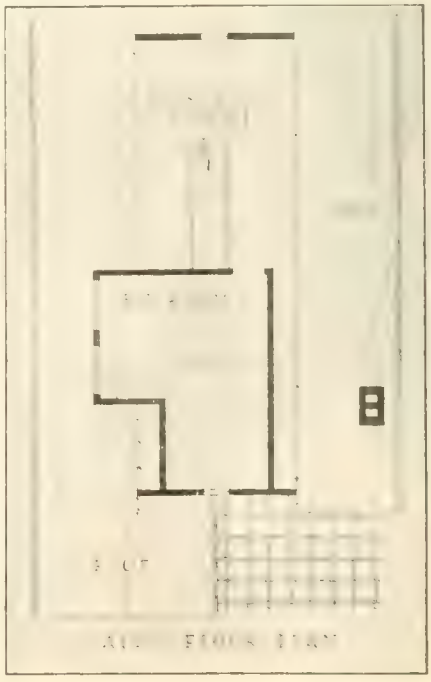
An examination of the plans will show all of the features that are demanded in the modern house; a vestibule to keep drafts out of the living room, a coat closet, linen closet, complete and compact kitchen with easy access to the outside and the cellar, and above all, large, sunny rooms. It will be noted in the plan that back of the vestibule there is provided a large closet to accommodate one of the popular disappearing beds so that the living room may serve a double purpose and in that way really provide 5 rooms on the first floor.

The construction is of frame over a concrete foundation. The exterior is coated with stucco and the porch floor is cement finished concrete marked off in large squares and edged with brick to give a note of color. A variety of pleasing effects may be worked out for the exterior by different tints of the stucco with pleasantly contrasting colors for the trim. One suggestion would be a light buff stucco with brown trim and light green sash and doors.

A Five-Room Bungalow in Western Style



THIS compact little bungalow will meet the requirements of many people who want to build moderate cost homes this spring. It may easily be fitted to a lot of 40-ft. frontage and can be built in most sections of the country for about $6,000. Complete blueprint plans are published in this issue. Additional quarter scale blueprints can be furnished at moderate cost. Mr. Robb will gladly answer any questions that may arise.



Quantity Survey

By Frederick H. Hunter

THE [illegible] All measurements are NET unless [illegible] sheathing, flooring, roofing, etc., are [illegible] Minor outs are disregarded. No attempt has been made to include all the small items nor such items as clearing the site, drains, supplies, [illegible] "Item" appears in the quantity column it indicates that the expense of the work in question would prob- [illegible]

[illegible]
loam to average 8 ins. deep .... 71 cu. yds.
Excavation for cellar .... 117 cu. yds.
Excavation for trench walls, footings, etc. .... [illegible]
Concrete for foundations .... 47 cu. yds.
[illegible]
[illegible]
Form trowel wash for basement sills .... 11 lin. ft.
[illegible]
Common brick for chimney and pier .... 112 cu. ft.
[illegible]
[illegible]
[illegible]
Thimble piece, included in above 1
Metal thimble for smoke pipe 1
Clean out door in chimney 1
Earth fill for porch; rammed .... 14 cu. yds.
[illegible]
Brick borders for porch; on edge .... 375 brick
(*See p.* 51.)
Granolithic floor for porch and terrace; note jointing .... [illegible]
[illegible] .... Item
Concrete steps; include forms, concrete and brush coat finish. (Step foundations in previous item)
Single step, 4′-6″ long 1
Run of 3 steps, 4′-0″ long .... 1 unit
2 steps in front wall with buttresses .... 1 unit
[illegible] .... 1 unit
Firestopping; would require about 3/4M brick Item
3″ round tile flue for venting gas range .... 14 lin. ft.
Finished fireplace; (rough fireplace and trimmer arch included in previous item for chimney)
Damper for 40″ [illegible] 1
Mantel bar; (unless patent damper which forms lintel is used) 1
Brick for facing, lining and hearth 175
6 x 6 tile insert in hearth 1
(*See p.* 51.)
3″ cement filled iron basement columns; include cap and [illegible] 2
[illegible]
Framing lumber
There are no especially long lengths needed—no joist over 14′-0″. Lengths are scheduled "to the next whole foot." That is, a piece 14′-4″ is counted 15′-0″. Length allowed for splices in sills, girts, ridge, etc.
(Framing is scheduled for balloon type)
[illegible]
6 x 8 y. p. girder .... 90 ft. b. m
4 x 6 girder .... 50 ft. b. m.
4 x 6 sill .... 240 ft. b. m.
2 x 9 floor joists .... 2450 ft. b. m.
Cross bridging [illegible] .... [illegible]
Total Carried [illegible]

[illegible]
2 x 8 rafters for main roof; include ridge lengths, mostly 17 ft. .... 1160 ft. b. m.
Saw rafter ends .... 50 pcs.
2 x 6 rafters for porch and dormer roofs; lengths under 12 ft. .... 200 ft. b. m.
2 x 6 and miscl. for framing rear platform and [illegible] .... [illegible]
Wall framing 2 x 4, 12″ o. c. Include in price for plate of 2 x 4 doubled, usual posts, bracing, etc. No outs taken for windows or doors on account of doubling and trussing .... 1525 sq. ft.
4 x 4 and 2 x 4, and miscl. blocking for porch piers .... 180 ft. b. m.
2 x 8 and miscl. for porch .... 110 ft. b. m.
Cut in 1 x 5 ribbon girt, with blocking 72 lin. ft.
1 x 4 roof ties in attic .... 60 ft. b. m.
Furr for porch ceiling .... 75 sq. ft.
2 x 4 stud partitions, 12″ o. c. with 3 x 4 y. p. cap and bridging; lengths measured to girder below; no outs deducted .... 400 sq. ft.
Non-bearing partitions of 2 x 4 and 2 x 3 studs; (include cap, sole and bridging) .... 1000 sq. ft.
2 x 10 for stairs .... 130 sq. ft.
Roof sheathing .... 1540 sq. ft.
Matched and beaded sheathing for cornice soffit .... 125 sq. ft.
Build cricket for chimney .... Item
Wall boarding for gable .... 70 sq. ft.
Underfloors; square edged boards .... 990 sq. ft.
[illegible]
Strap furr ceilings with 1 x 2 .... 1100 sq. ft.
Joist hangers, 4 x 9 over 4″ 4
[illegible]
Shingles for roof .... 14 sqs.
[illegible]
Roll or metal roofing for dormer .... [illegible]
(*See p.* 62.)
Flash over roof under stucco .... 31 lin. ft.
Flash under siding .... 8 lin. ft.
Flash and cap flash around chimney .... 12 lin. ft.
3″ metal leaders .... 63 lin. ft
Goosenecks and bends .... 6 each
Iron or Akron pipe for leader ends .... 6 pcs.
Exterior windows; (include sash and frame)
(*See p.* 4 *and back cover.*)
[illegible]
Similar basement windows, 2-lt. 2
8-lt. casements, 10 x 12; pr. sash in 1 frame .... [illegible]
8-lt. casements, 10 x 12; 3 sash in triple frame .... 2 units
6-lt. casements, 10 x 12; single 4
4-lt. casements, 10 x 12; 2 sash in 1 frame 2
Single casements for leaded windows 4
Leaded glass .... 20 sq. ft.
[illegible]

TOTAL BROUGHT FORWARD

Exterior doors; (include frames
(*See p. 4 and back cover.*)
- Front door, 3'-0" x 6'-8"; special door, glazed — 1
- Rear door, 2'-6" x 6'-8", glazed; 6 lts. — 1

Exterior finish
(*See inside of back cover.*)
- False rafter ends; band sawed to detail;
  - For main cornice — 48 pcs.
  - For porch cornice — 10 pcs.
- 3 x 5 wood gutter, drip and scribe mould,
- 3 1/2" x 7/8" wall fascia and quarter round, for main cornice — 78 lin. ft.
- Gutter and similar pieces for porch cornice — 16 lin. ft.
- Verge boards and 2 quarter rounds for gables — 78 lin. ft.
- Band saw ends to detail — 5 pcs.
- Sheath soffit of overhang — 78 sq. ft.
- Rake trim for dormer — 20 lin. ft.
- Bed mould between dormer rafters — 12 lin. ft.
- Brackets for front gable — 4 pcs.
- Brackets for porch gable — 2
- 5x10 dressed wood beam for pergola; 16 ft. long; end to detail — 1 pc.
- 4x8 dressed wood beam, 8' 0" long — 1 pc.
- 2x8 dressed wood rafters, 9 ft. long; end to detail — 8 pcs.
- 1 1/2x2 dressed wood strips — 66 lin. ft.
- False beam between porch and pergola — 8 lin. ft.
- Lattice for end of pergola — 1 unit
- Similar lattice, with opening, at end of porch — 1 unit
- Bench for pergola — 1 unit
- Siding for gable — 75 sq. ft.
- Casing, sill and brackets for dining room bay — 1 unit
- Rail for rear porch — 8 lin. ft.
- Posts for rear porch — 2 pcs.
- Lattice under rear porch — 6 sq. ft.
- 1x5 for lattice facing — 24 lin. ft.
- Risers for rear steps, 4' 0" long — 3
- Treads for rear steps, 4' 0" long — 2
- Wood flooring for rear platform — 16 sq. ft.
- Apron piece under threshold — 1
- Bulkhead doors and frame — 1 unit

Interior doors
(*See p. 4 and back cover.*)
- 3' 0" x 6' 8" — 1
- 2' 10" x 6' 8" — 1
- 2' 6" x 6' 8" — 5
- 2' 6" x 6' 8", glazed — 1
- 2' 4" x 6' 8" — 2
- Frames for single doors — 10

Interior finish
(*See inside of back cover.*)
- 3 1/2" plain trim with butt joints — 725 lin. ft.
- Window stools and aprons — 36 lin. ft.
- Wide stool for bay — Item
- Jamb and head for cased opening — 22 lin. ft.
- Pilasters in living room — 2
- Cornice in living room — 64 lin. ft.
- Base — 265 lin. ft.
- Mantel in living room — 1 unit
- Panel mouldings over fireplace — 1 unit
- Bookcase; include lining, shelves and top — 2 units
- Wardrobe for coat closet; (include flap doors and shelving) — 1 unit

TOTAL CARRIED FORWARD

TOTAL BROUGHT FORWARD

- Linen closet; (include flap doors and shelving) — 1 unit
- Cupboard in hall — 1 unit
- Shelves and hook strips for closets — 9 lin. ft.
- Hanging rods — 3 lin. ft.
- Case A, with cupboards in kitchen — 1 unit
- Sink; counter with drawers under — 1 unit
- Case B over ice box — 1 unit
- Case C over ice box — 1 unit
- Picture moulding — 160 lin. ft.

Stairs to 2nd floor
- Treads about 3' 0" long; closed ends — 13
- Risers — 14
- Nosing for top step — 1
- Skirt board — 30 lin. ft.
- Sheathed well rails — 20 lin. ft.

Finish floors; (include sheathing paper) — 960 sq. ft.

Single floor in attic — 550 sq. ft.

Cellar stairs
- Treads, 3' 0" long — 10
- Risers — 11
- Nosing at top — 1

Batten door in basement; (include frame) — 1

Studding for coal bin partition — 110 sq. ft.

Sheathing for coal bin partition — 75 sq. ft.

Build shovel hole and slide — 1 unit

Frame for 2 laundry trays — 1 unit

Plank steps in bulkhead — 1 unit

Plastering interior; (on wood or metal lath)
(*See pp. 3 and 61.*)
- Ceilings — 118 yds.
- Stair soffits — 5 yds.
- Basement ceiling; (if plastered) — 87 yds.
- Walls — NET 255 yds.
  (Or half outs, 292 yds.)
- Keene's cement dado in kitchen and bathroom — 20 yds.
- Deep reveal for windows over bookcases — 18 lin. ft.
- Corner beads — 35 lin. ft.
- Cement plaster for porch ceiling — 7 yds.

Exterior stucco on metal lath and back plastered, or on patent wood lathing with waterproof backing — NET 126 yds.
(*See pp. 3 and 61.*)
(Half outs, 137 yds.)
- Stucco for piers, arches, beams, etc., of porch — 30 yds.
- Form brackets in stucco — 2
- Stucco on chimney — 18 yds.
- Tile insets on chimney — 3
- Cement wash on top of chimney — Item
- Staging to reach chimney — Item
- Terrazzo floor in bathroom — 20 sq. ft.
- Terrazzo base — 10 lin. ft.

Allow for work not listed in the survey:
- General or overhead costs — Item
- Grading, walks, planting, sodding, etc. — Item
- Connections for water, sewer, gas, etc. — Item

Insert sub-bids for other trades:

Hardware (*See p. 4 and back cover.*)
- Allow for setting hardware — Item

Painting

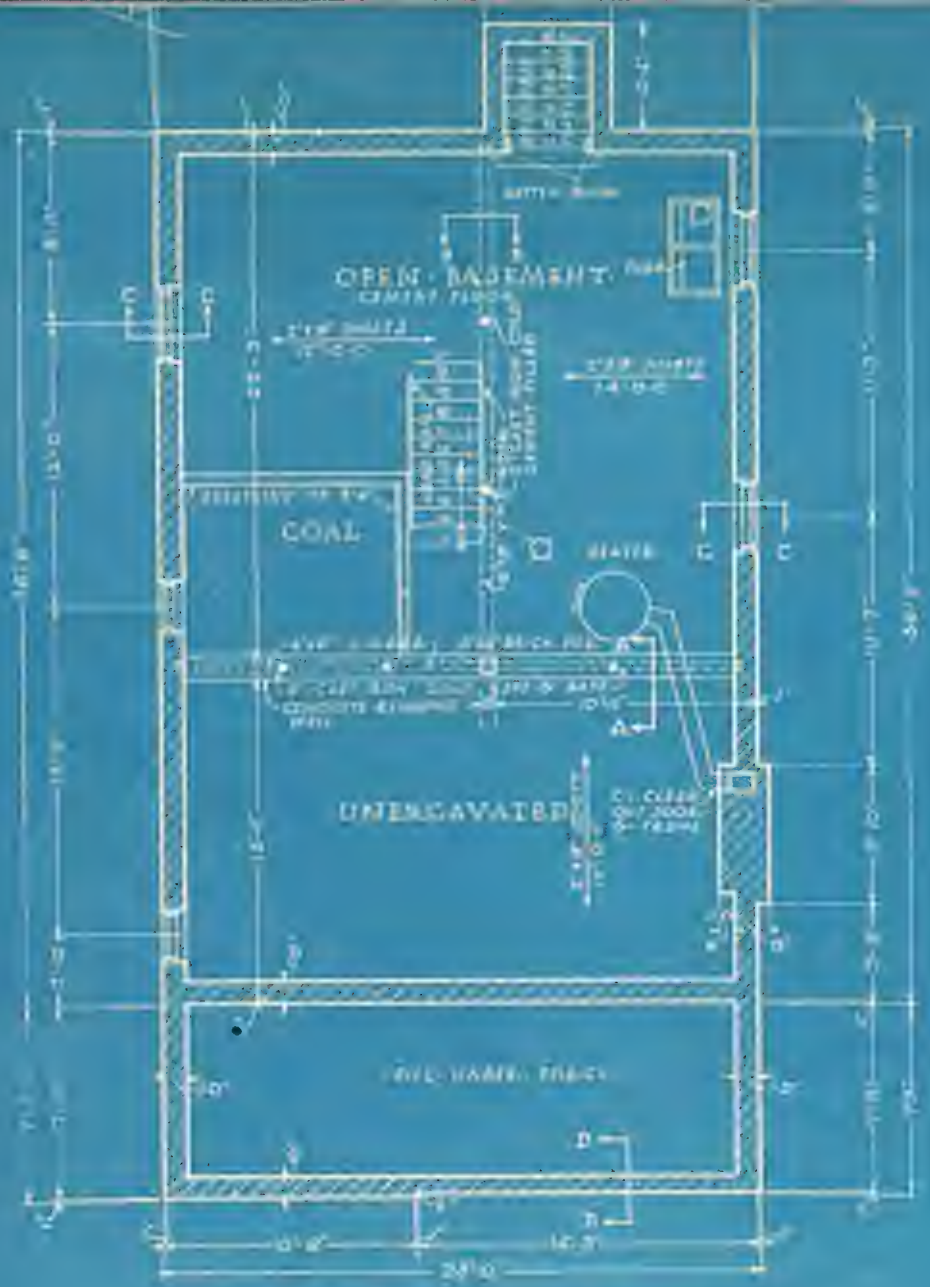
Plumbing

Heating
(*See p. 2.*)

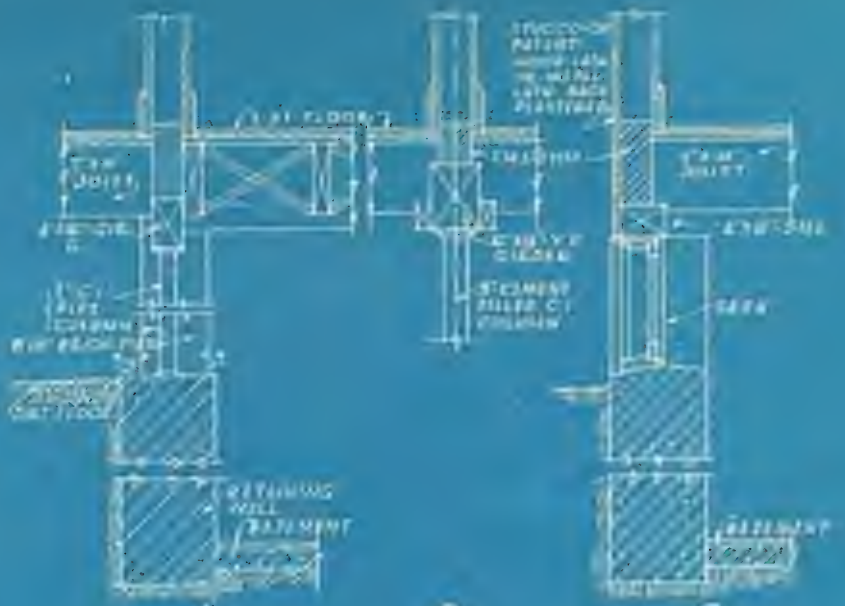
Electric work

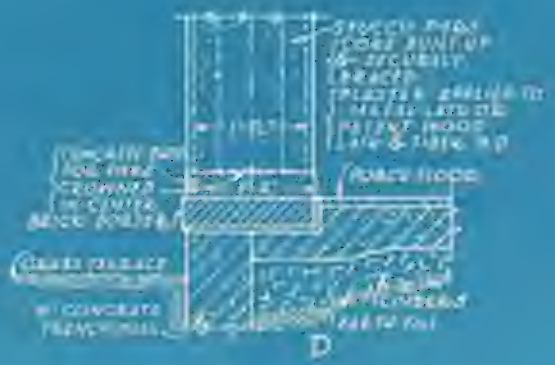
Fixtures

TOTAL AMOUNT



PLAN OF BASEMENT





DETAILS

DRAWING NO. 4

"A" FIVE ROOM BUNGALOW

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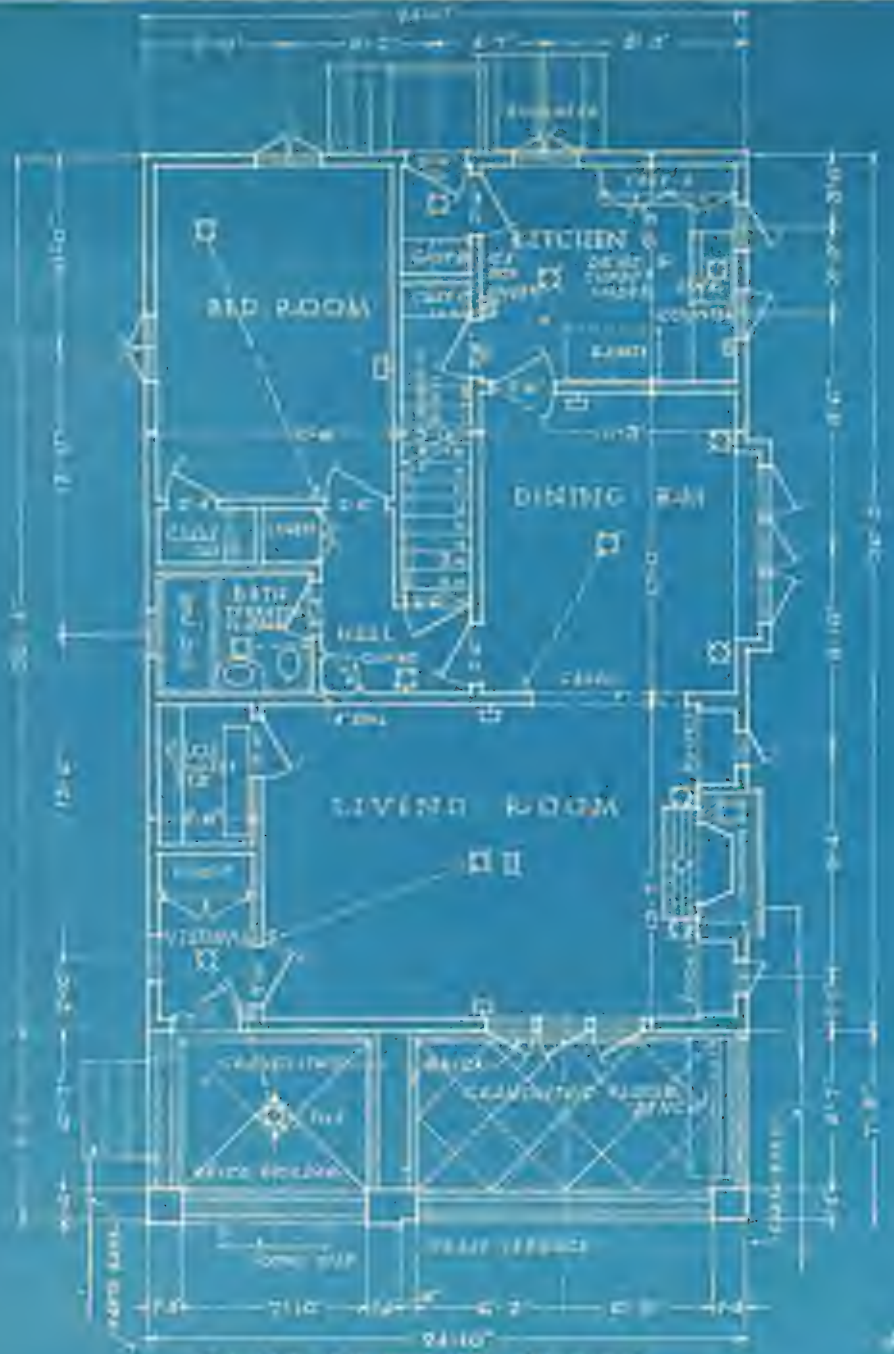
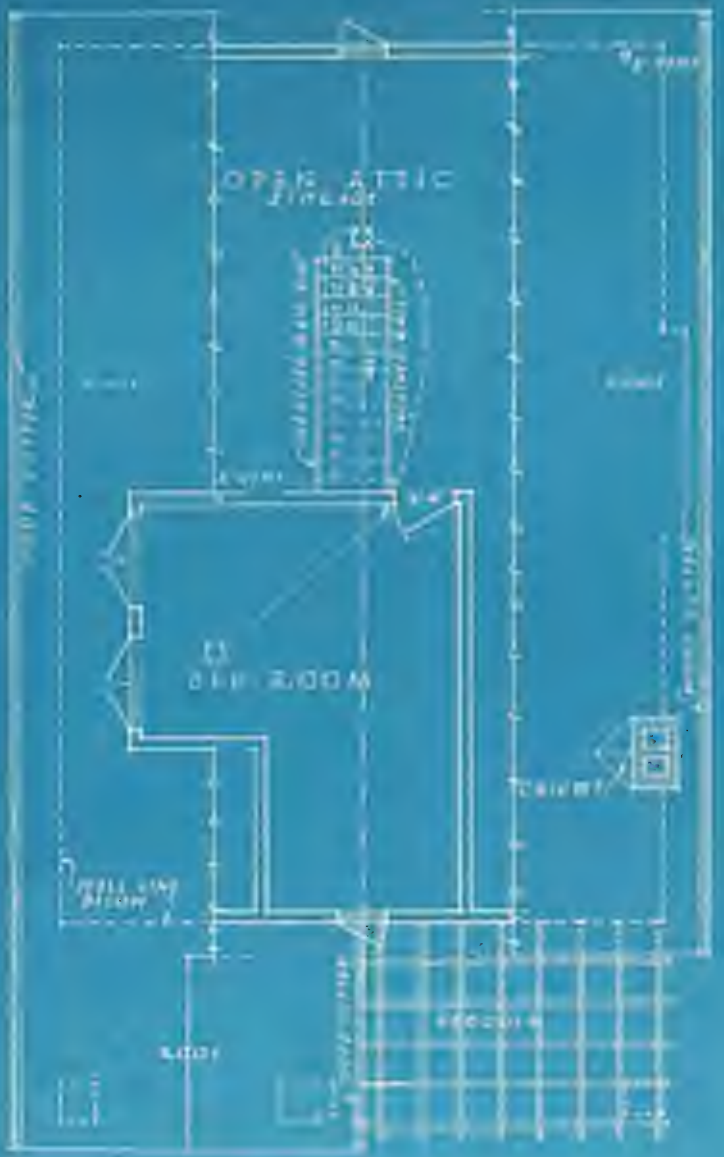
NO. 11 MARCH 1921



PLAN - OF - FIRST - FLOOR

Scale 1/8"-1'-0"



PLAN - OF ATTIC

Drawing No. 9

A FIVE ROOM BUNGALOW

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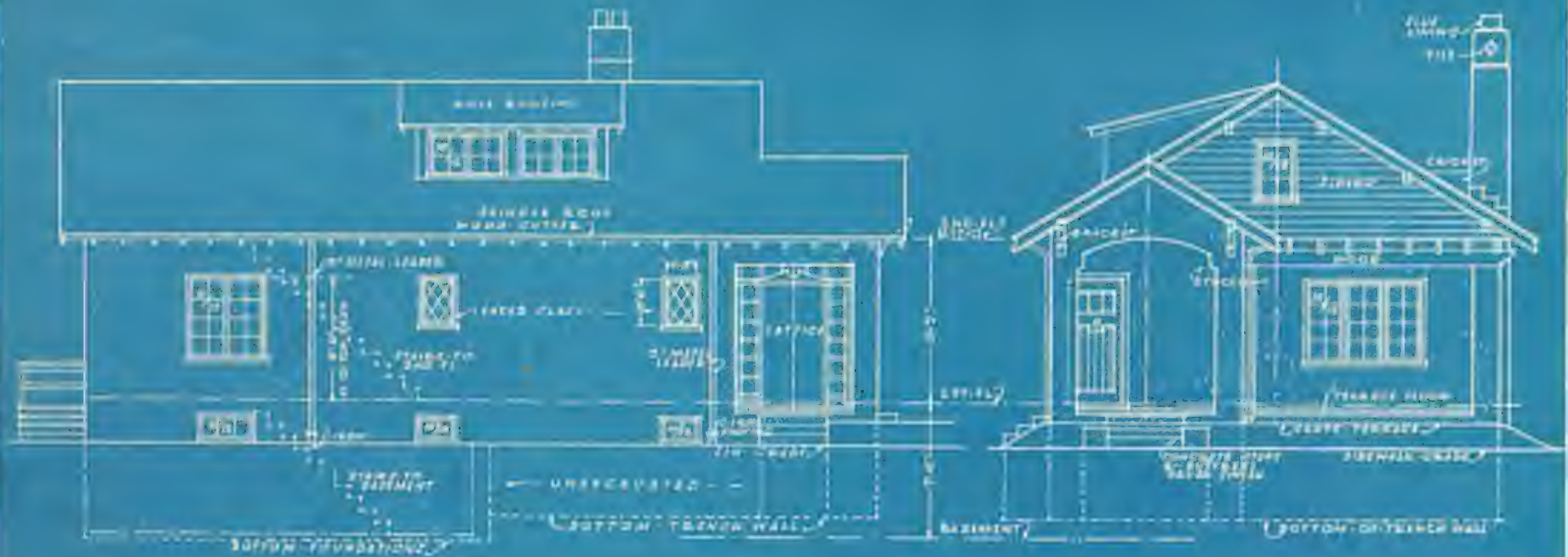

ELEVATION OF SIDE

ELEVATION OF FRONT

DRAWING No. 11

A FIVE ROOM BUNGALOW

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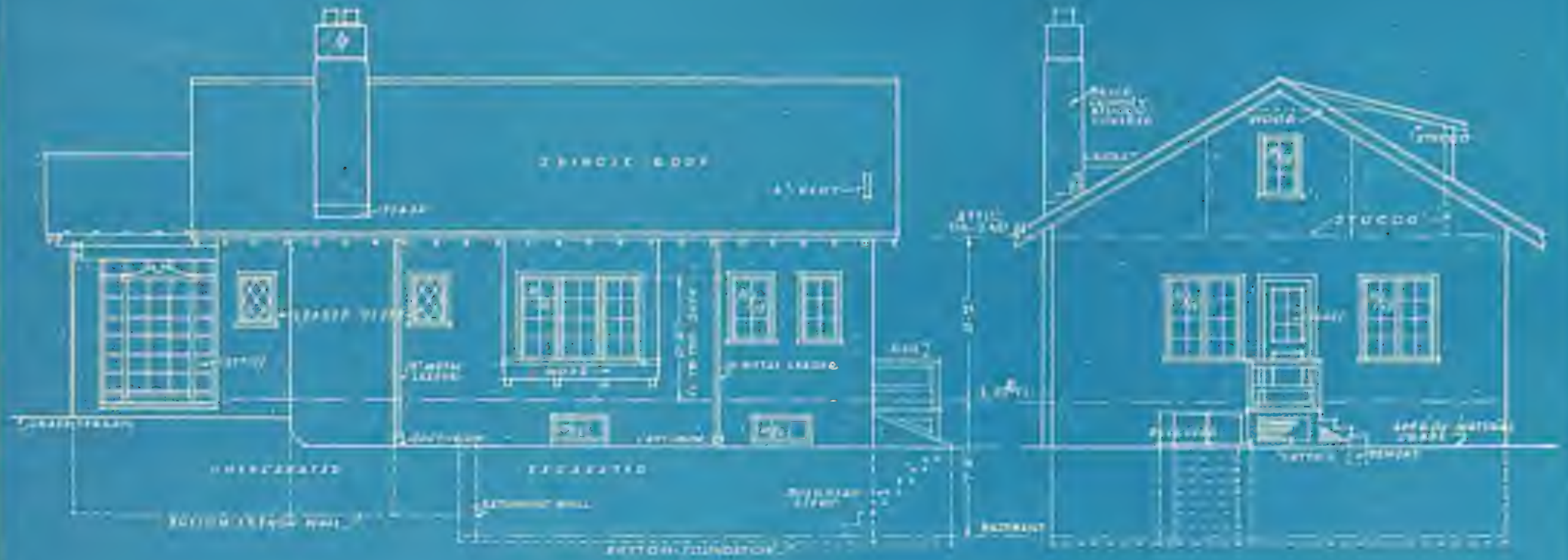


ELEVATION · OF · SIDE

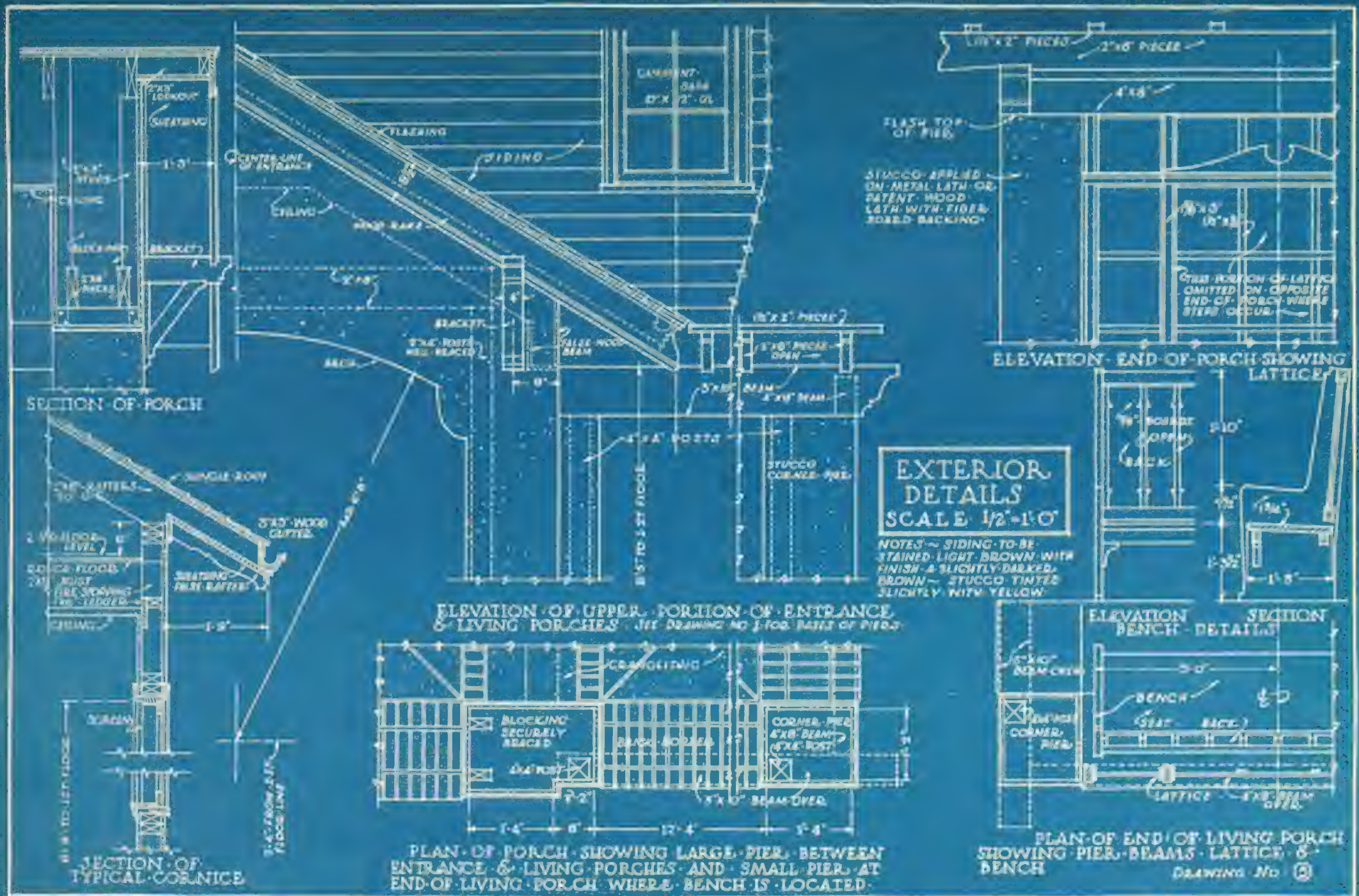
ELEVATION · OF · REAR

DRAWING NO · (4)

"A"
FIVE ROOM
BUNGALOW

The BUILDERS' JOURNAL WORKING DRAWINGS

NO · 11
MARCH · 1921



A Five Room Bungalow

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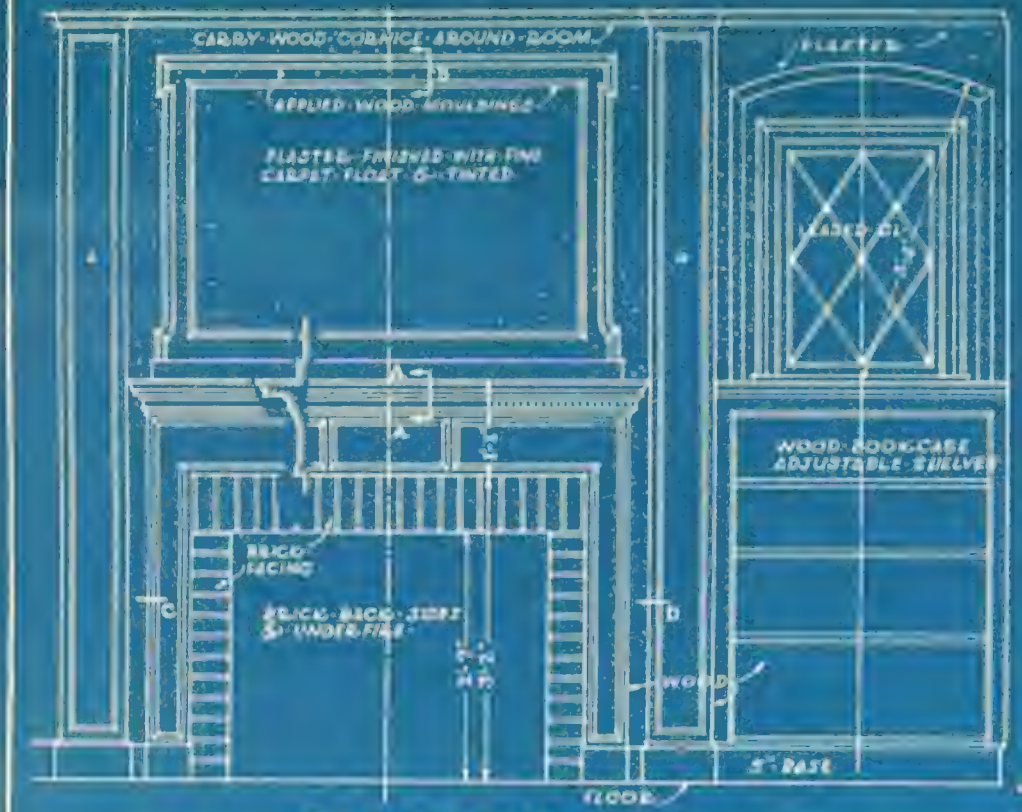
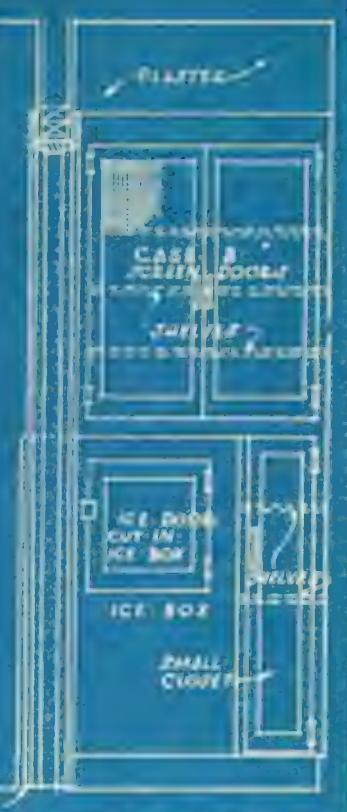


ELEVATION

SECTION THRU BOOK CASE

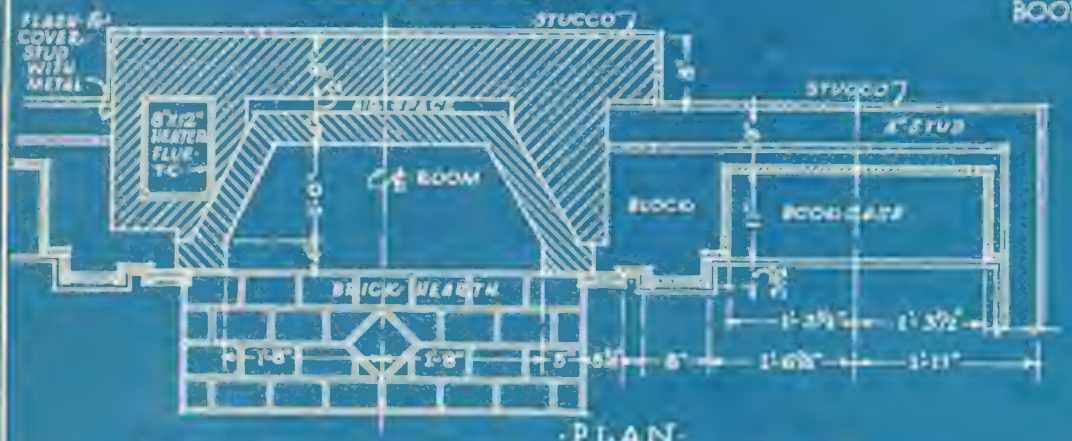
PLAN

ELEVATION IN KITCHEN



ELEVATION IN REAR END

ICE BOX & CASES B & C



PLAN

FIREPLACE END OF LIVING ROOM

INTERIOR DETAILS
SCALE 3/4" = 1'-0"

MOULDINGS SCALE 1/2 FULL SIZE

DRAWING NO. 6

A FIVE ROOM BUNGALOW

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NO. 11
MARCH 1921

MASONRY
Practical Information on Materials and Latest Construction Methods

Brick House Foundations

By William Carver

A FIRST class, dry cellar of neat appearance adds several hundred dollars to the sales value of a house, real estate men say. Choosing from among the variety of materials and modes of construction at his disposal today, the builder should bear this fact in mind. He should also analyze and carefully figure the costs of these various methods of constructing cellar walls, so that he may satisfy himself as to which is really the most economical under the exact conditions that apply in his locality.

Brick is an old, tried and tested material that has been used many centuries for important construction, and its suitability for foundation work remains the same today. In sandy soils brick for foundations and footings cannot be surpassed; it is widely used for house foundations in the Middle West where the soil is light and dry and largely unaffected by frost.

Not only on simple house basements, but on elaborate engineering work brick construction proves its claim to economy. Col. George W. Rathjens, noted engineer, was recently confronted with a difficult foundation and waterproofing problem at Norfolk, Neb. Part of this work was carried out in concrete, but he says that the most difficult section was carried out in brick, reinforced with rods in the same manner as concrete. He reports that concrete would have cost considerably more than the reinforced and waterproofed brickwork.

From the engineer's point of view it is desirable to be sure of the integrity of every portion of the load-bearing structure. The unit type of masonry construction alone assures this. Every portion of brick wall or pier is laid and bonded by an expert mechanic. Its strength is a matter of certainty.

When building a brick basement wall the harder burned brick are selected and used for this purpose. Soft brick or those known as light hards would make a wall which would be damp and apt to disintegrate under action of frost. Very often hard burned culls are used in this work, and they often cost less. A 12-in. brick wall is adequate for the average house foundation. It should rest on a footing of brick or concrete. The hardest bricks should be selected for footings, and laid in cement or hydraulic lime mortar, grouted or thoroughly slushed up so that every joint is filled; the bottom course should be laid on a bed of mortar after the trench has been carefully leveled. This course should be laid double; all others are best laid single, the outside being all headers with each course projecting no more than a quarter brick beyond brick above.

It should be remembered that the function of a masonry foundation wall is to resist pressure and to support the load. To resist dampness and water with certainty, waterproofing of a type that will take care of the degree of moisture encountered must be selected and placed upon the surface of the wall. This country and Europe abound with brick basement walls, dry and satisfactory in every way, which have not received any special treatment to resist dampness. Unless the soil is of a specially dry nature, however, it is taking something of a chance to provide no damp-proofing. This applies to every type of masonry wall, brick, concrete and stone included, for although brick in the average soil resists dampness as well as other types of masonry, no wall can be expected to resist

The only staging required for the small brick foundation is that for the piers and chimney. Note, in the right hand corner, the cement coating for damp-proofing

The brick basement can be constructed with the minimum of equipment. The masons build from the excavation and, as the walls go up, from the bank

the penetration of water in constant contact with it. Chief reliance must be placed upon some form of waterproofing, carefully selected for the specific condition and properly applied.

The builder should, as a means of insuring a dry cellar, always place upon the surface of the wall—be it of brick, concrete or stone—the kind of waterproofing or dampproofing necessary. It is a matter of comparatively slight expense to do this at the time of construction but if neglected until the damage is done he will have not only an expensive and difficult operation, but a dissatisfied customer. It should be remembered also, as pointed out in a previous article, that the brick wall, by reason of its numerous units, will adapt itself to a considerable amount of uneven settling of the soil without cracking and without disrupting the skin of waterproofing placed upon it.

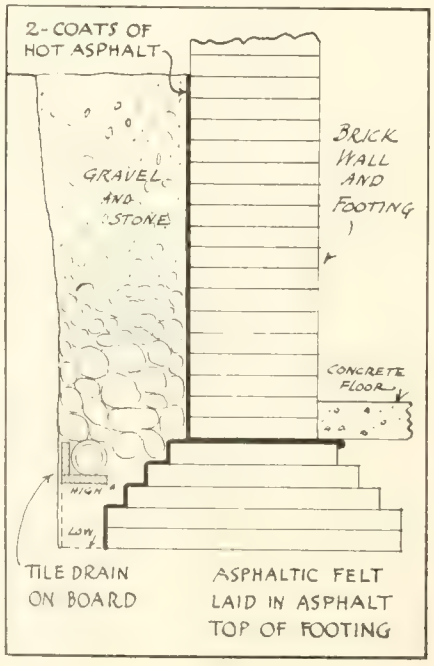
Brickwork bonds excellently with any kind of waterproofing. The best joint to use for the purpose is a rough cut joint—the cheapest joint that can be formed—for to make it the bricklayer simply cuts off with one motion the excess mortar squeezed out beyond the face of the wall. To recommend struck joints for this purpose is an error, for the struck joint does not provide the flat surface, flush with the brick, that the rough cut joint affords, upon which to place the waterproofing. Brickwork has also the advantage of drying out quickly; waterproofing can in fact be placed upon it with safety as soon as the wall is built. In using any kind of waterproofing the greatest care should be taken to see that the surface to which the waterproofing is applied is absolutely dry. Stone walls must be plastered on the outside to provide a smooth surface upon which the waterproofing can be placed. Sometimes a rubble wall is built without this precaution, the rough exterior surface allowing the penetration of moisture bearing earth into its joints, and this may lead to a damp wall. The same criticism holds good regarding concrete that is poured directly against a bank of earth with forms on one side only. For a satisfactory wall it is quite as important that the exterior face be laid up to an even surface as the inside.

If a head of water is encountered waterproofing must be made heavier and more elaborate. It must, in fact, extend under the whole area of the cellar floor, through the walls and up the sides to form practically a tank. The waterproofing under the floor must have over it a sufficient thickness of material so that the pressure from below will not force it up.

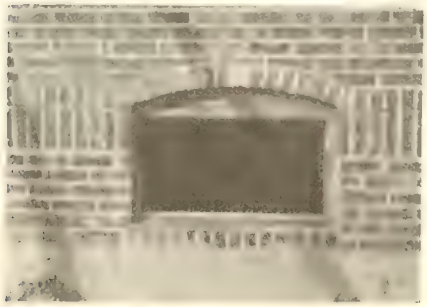
It is easy to construct a brick wall with sufficient strength to resist hydrostatic pressure even if the water level is up to grade. This is a condition not often met with in ordinary house work, but in clay soils water from downspouts, from surface seepage, or from seams in the clay may become pocketed, with the basement wall forming one side of the pocket. Seepage will not occur if the waterproofing has been well selected and properly applied.

In the average house foundation where serious waterproofing conditions are not encountered, and surface water only has to be provided for, a coating of asphalt or Portland cement will prove effective against dampness, but in view of possible settling, the asphalt should prove better because of its greater elasticity. The asphalt should be applied boiling hot in 2 coats and carried down to the bottom of the footings.

The detail below shows method of damp-proofing a wall by hot asphalt applied to outer face and layers of asphaltic felt on top of footing to prevent dampness rising in wall



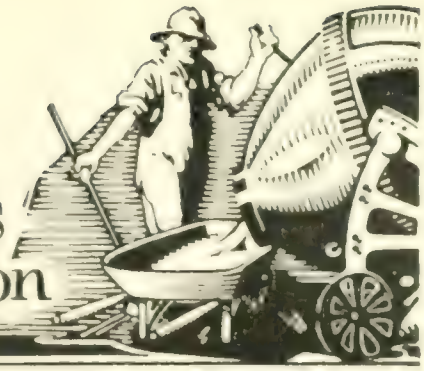
Note the neat appearance of the soldier course and header course breaking into the rowlock arch



View of finished foundation showing level bed provided for first floor sill

CONCRETE

Form Work-Reinforcing Methods Monolithic and Block Construction



Waterproofing and Damp-Proofing

By Henry C. Sheils

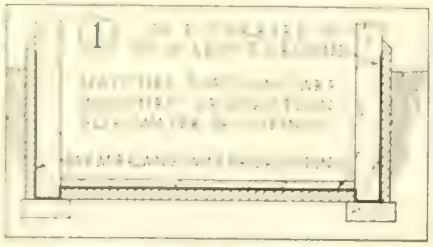
Consulting Engineer, National Waterproofing Co.

THE general subject of waterproofing concrete divides itself naturally into 2 divisions—waterproofing and damp-proofing. Waterproofing is confined to work below the ground, such as building foundations, tunnels, tanks, etc., and to structures above ground, such as reservoirs and tanks where a head of water is encountered. Damp-proofing relates to keeping water and dampness out of the superstructure of a building by treating the exposed walls.

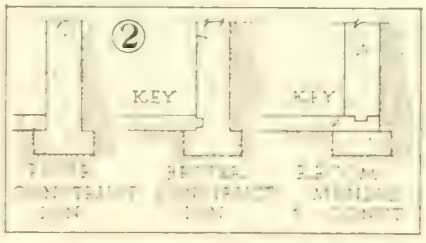
With the development of concrete and its steadily increasing use, waterproofing and damp-proofing became so essential that extensive investigations were made, with the result that today structures can be made absolutely water tight and damp-proof, and with the certainty that they will remain so.

Waterproofing and damp-proofing have developed into a separate branch of the building trades, and are recognized as such, just as much as plumbing, heating or lighting. Companies have been formed in different sections of the country with experienced engineers at their head, which specialize in waterproofing work and guarantee results. These companies fill a long felt need in the building world, and a great amount of credit is due them for the rapid development of concrete. There are many cases, however, where contractors can make structures water-tight, and the purpose of this article is to present the fundamentals of waterproofing and damp-proofing in non-technical terms, so that the average contractor can grasp these fundamentals and use them to advantage.

Waterproofing is done by 3 different methods, known as the Membrane system, the Integral system, and the Plaster Coat method. The Membrane system is the oldest of these methods. Briefly described, waterproofing of this kind means insulating the structure to be waterproofed, from contact with water, by means of a bituminous shield. This is shown in Fig. 1. The bituminous shield consists of alternate layers of hot bitumen and either tarred paper or felt impregnated with bitumen. This method is seldom used with only 1 layer of felt or paper, 4 or 5 layers being the custom and sometimes 7 or 8. The



Heavy line shows membrane coating



Joint between concrete floor and wall

layers are called "plies," that is, 5-ply membrane waterproofing means a coat of hot bitumen, and then alternate coats of felt and hot bitumen until 5 layers of felt have been placed, then another coat of hot bitumen.

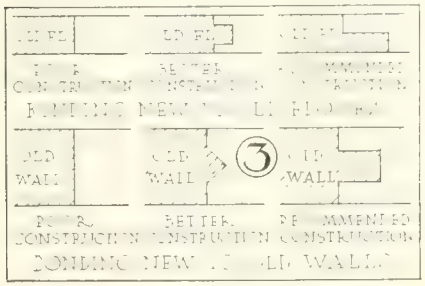
A great deal of care is necessary in using this method, for if the shield were punctured, water would find entrance. To protect this shield as much as possible, additional walls and floor slabs, shown cross-hatched in Fig. 1, are built. These extra walls and floors cannot be counted on to carry any stress caused by the live or dead loads in the structure, but are for protection of the waterproofing membrane. The advantage claimed for this method is that any settlement which might occur and crack the walls would not break the waterproofing shield, and the shield remaining continuous still prevents the passage of water from the outside, through the cracks in the walls or floors.

The one great disadvantage of the Membrane system is the difficulty in locating and stopping leaks, should they occur. The chief trouble is in locating the leaks in the membrane, because in many instances they show on the inside face of the wall as much as 50 ft. from the hole in the membrane shield, the water finding its way along between the membrane and the wall, and appearing on the wall in local spots where there may be stone pockets or a number of voids. On the Boston subway, which was waterproofed in this way, the method used to stop leaks was to drill holes through the wall where the leaks showed, and puncture the membrane. These holes were about 18 ins. on centers and large enough to admit a 1-in. pipe. A force pump was connected to the pipe and a very wet grout (1 part cement, 1 part sand) was forced into the ground outside.

The next oldest method is the Integral system. Theoretically this is the ideal system for waterproofing, for it means incorporating in the concrete a compound which makes the concrete impervious to water. A great deal of experimenting has been done on this method, and today very satisfactory results are obtained. Early in the experimental stage, hydrated lime mixed with the concrete was used. This showed an improvement over the concrete mixed without any hydrated lime, but it came far from making the concrete water-tight. There are a number of proprietary waterproofing compounds on the

market today, some of which have great merit while others are purely sales propositions.

Good, sound concrete is necessary in waterproofing by the Integral method, and it might be well at this point to call attention to some principles essential to getting



Details of bonding new and old work

good, strong concrete. Briefly, they are:

(1) Proper proportioning to get dense concrete.
(2) Suitable materials.
(3) Proper mixing.
(4) Proper placing.
(5) Proper spading.

Every contractor knows the importance of these principles and with a good integral waterproofing compound incorporated in the concrete and with the proper precautions exercised, no trouble should be found in obtaining waterproof concrete.

The writer has done considerable waterproofing work by this method, and guaranteed his results, by keeping a man on the job who installs the waterproofing in the concrete and also notes that proper care is taken. Here are a few "Don'ts" which it would be well to remember in connection with this work:

Don't deposit concrete in water. Use a pump and keep water away from the concrete until it has set, 24 to 72 hours, depending on conditions.

Don't deposit the concrete in one spot and allow it to flow into place. This causes separation of the ingredients of the concrete and means the formation of stone pockets.

Don't attempt to start a day's pouring where the new concrete is to be joined to the old, without preparing the joint. The laitance or scum which comes to the surface of the set concrete should be chipped off, the surface thoroughly cleaned, and slush-coated with a mixture of neat cement and water.

If these precautions are all observed, the only trouble which might occur in waterproofing by the Integral method would be at joints, and these can be taken care of. This is done by calking with a bituminous material which bonds with the concrete on either side of the joint, and remains plastic at all ranges of temperature to which it is subjected. Key-ways should be left at all joints. Figs. 2 and 3 show poor and good integral waterproofing construction.

The great advantage of integral waterproofing lies in the possibility of locating leaks which might occur. If settlement causes cracks, these can be dug out and filled with a mixture of cement, sand, water and waterproofing. Fig. 4 shows how cracks should be cut out and filled. The recommended method is such that the force of the water pressure wedges the grout and helps to make the joint tight.

No mention, thus far, has been made of the nature of integral waterproofing compounds. These vary somewhat, but the majority of them today are essentially metal soaps, which have the peculiar property of not being soluble in water, but remain in suspension. The particles in suspension, much finer than cement particles, are inert fillers, and fill the voids in the concrete which are too small to be filled by the cement particles.

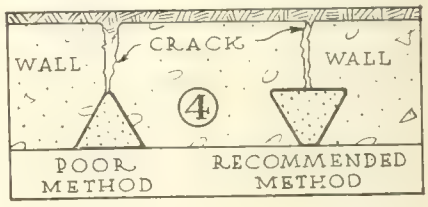
Integral waterproofing compounds are sold as powders, pastes and liquids. The powders are mixed dry with the cement, but experience has shown that they are not as efficient as pastes and liquids. Thorough mixing of the powder and dry cement is not easily obtained, with the result that the waterproofing powder is not uniformly distributed throughout the concrete. With pastes and liquids, however, this trouble is avoided since they are mixed with the water used in tempering the concrete. The water must necessarily permeate the whole mix of concrete, and therefore carries the waterproofing agent, mixed with it, throughout the entire mass.

The third method, the Plaster Coat, has become very popular within the last few years, because it can be used on both old and new work. Fig. 5 shows how it is used in a building foundation.

It consists essentially of a mortar containing 1 part cement, 1 to 2 parts sand and an integral waterproofing compound, and is applied with a trowel. A leaner mortar is weak and will not make a good bond, while a richer mortar is subject to cracks. This method is best employed by waterproofing experts for great care is needed to obtain good results.

It is always placed on the floor and inside faces of walls which are to be made water-tight. The walls and floors are very thoroughly chipped in order to roughen them. Then they are carefully cleaned with a diluted acid. This acid is then neutralized with a basic salt and thoroughly washed from the surface. The plaster is applied on the floor in 1 coat and on the walls in either 2 or 3 coats, depending on the thickness desired. For ordinary conditions 2-coat work on walls is generally sufficient. This gives a thickness of 5/8 to 3/4 in. Generally 3-coat work is put on 1 in. thick. The thickness on the floor is 1 in. to 2 ins. and serves as a granolithic finish, being a hard, serviceable topping.

Success in using this method depends primarily on the bond between the plaster and the masonry. The writer has seen samples from



Methods of stopping leaks in walls

many different jobs where alterations were made, and concrete with a waterproof plaster on it cut out. In no case could the plaster be separated from the concrete, the concrete breaking out with the plaster firmly attached to it. Waterproof plaster can be applied to brick walls as well as to concrete walls, and the writer can point to a brick tunnel with a 40-ft. head of water on it, which was successfully waterproofed on the inside with a plaster coat.

The Plaster method has been used with great success for oil-proofing concrete tanks which are to contain fuel oils. In this case the 1 application of the waterproof plaster prevents the seepage of water from the outside into the tank, and also the seepage of oil from the inside of the tank to the outside. This method, like the Integral, has the advantage of ease in locating and stopping leaks. Leaks can only occur through cracks, and these cracks are dug out and filled as shown in Fig. 4. This method is less expensive than the Membrane system, and is sometimes less expensive and at other times more expensive than the Integral system,

depending on the fineness of the concrete.

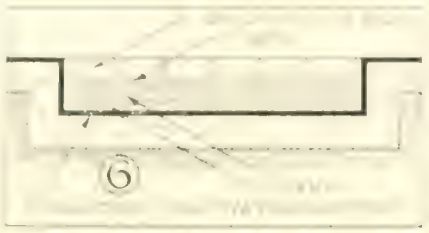
In connection with waterproofing it would be well to speak of the setting of boilers on a bed of waterproof concrete. Concrete, as is well known, is very rigid and has a tendency to crack when exposed to heat. Hundreds of cases of cracks in waterproof concrete due to boilers have been called to the writer's attention, and he has remedied them by filling the cracks in the concrete and insulating the concrete as shown in Fig. 6.

In concluding this article on waterproofing, the writer desires to call attention to the fact that many men have tried to waterproof structures by painting them with certain so-called waterproofing compounds. They have generally had the same result,—dismal failure,—for ordinarily waterproofing can be done successfully only by one of the 3 methods described here.

Damp-proofing has for its purpose only the keeping of dampness out of the super-structure of a building. Expensive treatments, as described earlier in this article for waterproofing, are not necessary.

Damp-proofing is accomplished by these methods: Transparent coatings, Opaque decorative coatings and Bituminous coatings. One of the earliest uses of Transparent coatings was the treatment of a concrete or brick surface with alternate solutions of soap and alum, generally applied hot. The theory involved was the formation of a metal soap by the reaction of the 2 solutions. Theoretically this appears to be an effective damp-proofing process, but in practice it was usually found to be very unsatisfactory, because of the great number of coats which were necessary in order to get a good reaction between the alum and the soap solutions.

Another method of Transparent damp-proofing consists in heating the surface to be damp-proofed and treating it with hot wax or paraffin. This method is very effective but usually expensive, as the surface must be heated with a blow-torch to a high temperature, and the wax applied while the surface is very



Section showing method of protecting concrete from heat of boilers

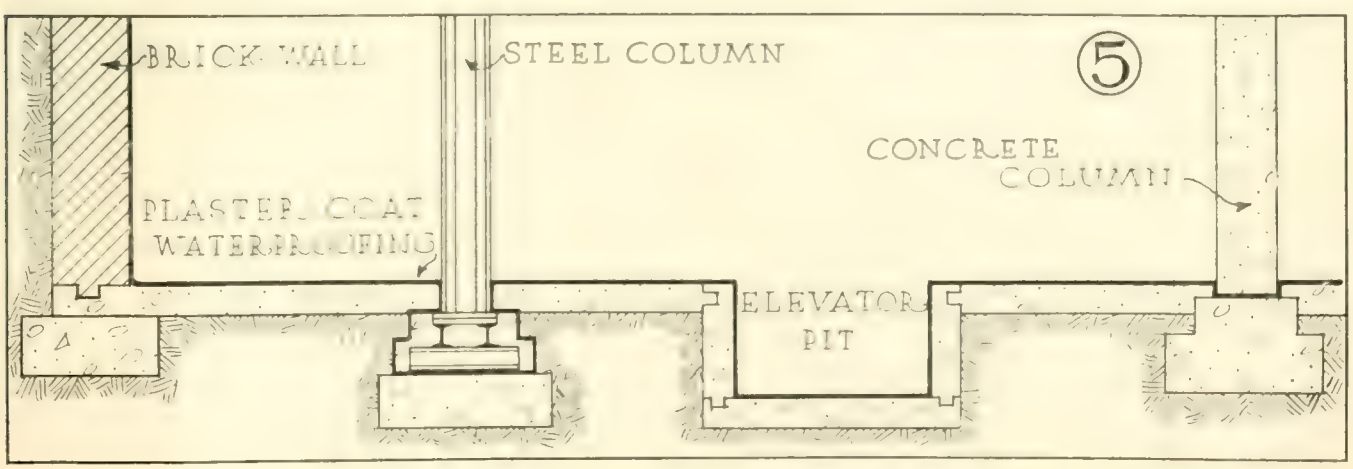
hot. Cleopatra's Needle, in Central Park, New York, was waterproofed by this method. Cleopatra's Needle is an obelisk brought from Egypt. It resisted the climatic exposure of Egypt for ages, but when exposed to the damp and cold weather in New York it began to disintegrate. The damp-proofing treatment consisted in removing all of the disintegrated material, thoroughly cleaning the entire surface, nearly 300 sq. yds., heating it, and treating it with melted paraffin. This work was done with great care and the result has been very satisfactory.

A number of colorless damp-proofing compounds are now offered for sale under different trade names. Most of these have the same base and good results have been obtained from their use. The treatment in all cases is the same. The walls to be damp-proofed are thoroughly cleaned, then the damp-proofing compound is applied with a brush. The number of coats necessary depends on the porosity of the walls to be damp-proofed, and in most cases 3 coats are sufficient. Every pore must be filled with the compound and the final application serves as a seal-coat. When carefully applied, successful results can be obtained. This treatment is used successfully to a great extent on brick buildings to prevent efflorescence, that is, the leaching out of the lime salts in the brick.

Opaque decorative coatings consist of cement washes, oil paints and proprietary paints. Ordinary cement washes, while they make a more dense shell on the outer surface of the wall, frequently fail as a damp-proofing agent, because as the water evaporates from the surface a number of small pores remain and water finds its way through these pores.

There are a number of Bituminous coatings, some applied hot and some applied cold, which have shown good results. These are applied on the inside faces of walls with a brush or a mop, and the result is a heavy, black coating which remains tacky. They are very extensively used, because in addition to their damp-proofing properties, they form a bond for plaster, so that furring is unnecessary. In general 2 or more coats are necessary.

The writer desires to emphasize again the importance of details, for often they mean the difference between success and failure. Waterproofing is a highly important branch of engineering and much depends upon its being thoroughly done—and to do it properly the engineer needs both training and experience.



Sections through pit and various types of footings showing plaster coat waterproofing

CARPENTRY

Good Practice in Frame Construction and Finish

Details of Framing

I. Modern Methods of Sill and Girder Construction

By Carl Johnson

FRAMING construction has in past years undergone several changes in attempts to reduce the amount of labor and lumber involved, and in the changes several practices have developed that are not in accord with good construction. It is, therefore, to be expected that in the average frame building a few years after erection we should find uneven settlement, large cracks in the plaster, twisted girders and other defects which do not become evident until it is an expensive matter to repair them.

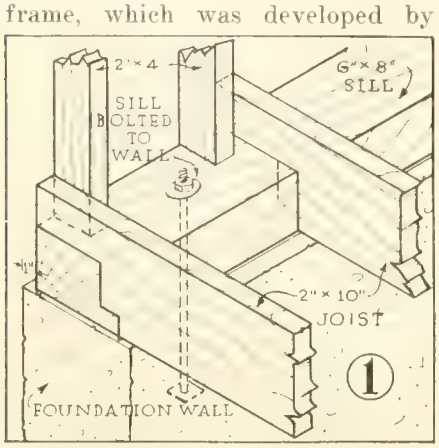
With the type of lumber that is generally used today, which has not been properly seasoned and which is often exposed to much dampness, there is reason why special precautions should be taken with wood framing and in this series of articles the various points of connections, equalizing shrinkage, and other details of framing for different types of construction will be considered. In the present article details of the first floor framing are taken up and the accompanying diagrams show good practice for various conditions.

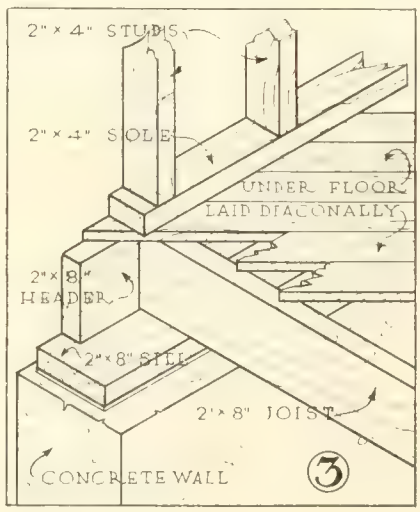
Our present method of framing construction, in most localities, is a combination of the old braced frame, which was developed by early New England builders, and the balloon frame, originating in the Middle West, and which is built up wholly of 2x4 sticks of lumber with nailed joints throughout. The braced frame used larger timbers and connections were made by more or less elaborately cut joints tenoned and pinned together; this type was developed at the time when nails were expensive and labor cheap. The balloon frame, on the other hand, economizes in the use of labor and it can be quickly erected without any great knowledge of carpentry. It makes, however, a light and flimsy structure which, if not carefully arranged with fire-stopping, is quickly consumed in a fire owing to the free passage of air through the frame and the small sizes of the lumber in it. Certain features of both types of framing are good under today's conditions, nevertheless, and most wood framing shows a combination of these methods.

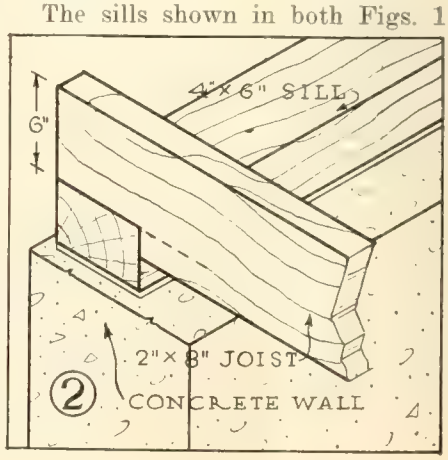
Consider first the sill. Fig. 1 shows a substantial type, based on the braced frame, that should be used for frame buildings of large size. It calls for a 6x8 into which the floor joists are gained 2 ins. in and 4 ins. down with the bottom of the joists resting on top of the foundation wall. The sill should be laid in a bed of cement mortar and should set in 1 in. from the outer face of the foundation wall and, in buildings where the sill is 4 or 5 ft. above the grade, it should be anchored to the foundation by means of bolts which have been previously built into the wall. The exterior studs rest on top of the sill and are toe-nailed to it.

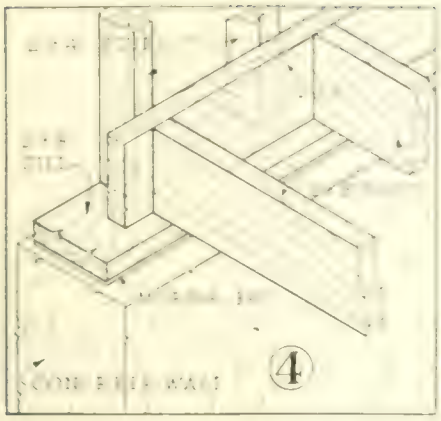
Fig. 2 shows this type of sill, as it is commonly used in small dwellings, with the joist simply notched on the lower side to the depth of about 2 ins. so that only part of the depth of the joist bears on the sill. This construction is not to be recommended because, as frequently happens, the notch in the joist is made more than 2 ins. deep and with any weight on the joist a crack develops as shown by the dotted line. In this sill it is not necessary to use a solid stick for practically the same strength can be had from a built-up member and with the advantage that the joints can be easily broken by lapping the pieces.

The sills shown in both Figs. 1









and 2 leave spaces between the tops of the sills and the floors which should be filled up with masonry to form fire-stopping, as otherwise this will permit an easy passage of flames from the basement into the exterior walls.

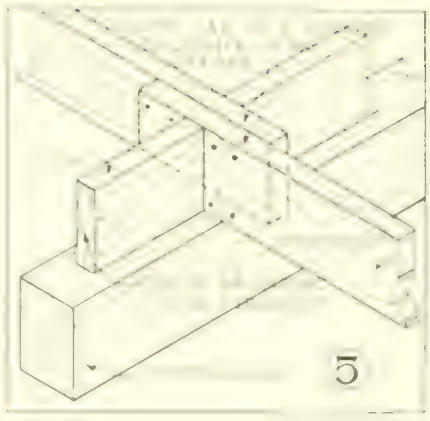
Fig. 3 shows a sill frequently used in the Middle West known as the box sill which is quickly put together and which for the average dwelling house meets the necessary requirements for strength. It is formed of a stick the same size as the floor joists laid flat side on the foundation 1 in. from the outer edge and set on it, as a header, is another joist. This forms an L shaped piece into which the floor joists set; the joist should be toe-nailed to the header and the lower member of the sill provides full bearing for them. The rough underflooring is then laid to the outside edge of the header and a 2x4 sole piece nailed on this to which the wall studs are toe-nailed. No special fire-stopping is necessary with this sill inasmuch as the header piece performs this function. It is necessary with this type of sill to spike the various members together firmly and also to strengthen the end joints and the corners where one piece must butt against the other.

Fig. 4 shows a variation of this sill which is more rigid and should preferably be used, especially in buildings that are to be stuccoed; in the method shown in Fig. 3 there is a large area of solid wood on the outside face of the wall over which it would be difficult to get a satisfactory key for the stucco, and the shrinkage of these members would also tend to develop cracks in the stucco surface. The difference in the sills is simply that the header piece is moved in to allow the 2x4 studs to be set on the sill piece flush with the outer edge. Here again the different pieces should be well spiked together.

Connections between floor joists and girders should be carefully studied so that the depth of timber from the tops of the joists to the bottom of the girders should be the same as from the top of the joists to the under parts of the sills in order to obtain equal shrinkage in outer and inner walls. In a great deal of frame construction this point is overlooked and the result is unequal shrinkage which is sure to develop uneven floors and plaster cracks.

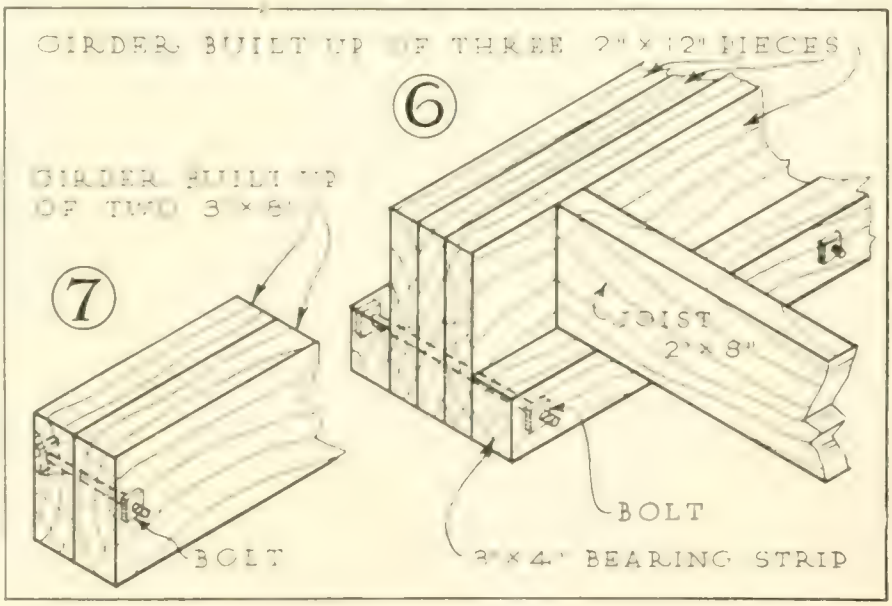
The simplest method of arranging girders and joists is shown in Fig. 5. This, however, gives the greatest amount of shrinkage and for that reason should not be used in house construction. In other cases, where this objection does not hold and when the joists are not continuous over the girders, they should be lapped as indicated for the distance of 12 ins. and spiked together. With construction of this type there is also need for fire-stopping to close the opening over the girder between the joists and this can best be accomplished by fitting in between the joists solid plank bridging as shown.

In order to equalize shrinkage it is necessary usually to have the joists and the girders so framed that they are flush on top. Fig. 6 shows the best practice for such connections where any considerable weight has to be carried. The girder may be one stick of timber or built up with sections of plank. On each side, at the bottom of the girder, there should be attached pieces of wood, called bearing strips, of a size 3x4, the 4 ins. being the vertical dimension. These strips should be bolted through the girder with 3/4-



in. bolts spaced from 16 to 20 ins. which are strong enough for supporting 2x10 joists and the joists may then rest on them and be toe-nailed into the girder. In lighter construction, such as holds in the average house, bolting is not so necessary and these pieces may be attached to the girders by spikes; should the girder not be deep enough to permit the whole of the joist to rest on the bearing strip and still be flush with the top of the girder, the joist may be notched down over the strip.

As already said it is not always necessary to use solid timbers for girders, for if well spiked together and carefully made fully as much strength can be developed from a built-up piece and it is a much more convenient type in sections where large timbers are difficult to get. The solid stick is furthermore apt to twist and check and in the built-up piece this is eliminated, particularly if care is taken to have the grain run in opposite directions as is indicated in the drawing. The checking and twisting in a large stick may be largely eliminated if



it is cut lengthwise in halves, the 2 pieces being bolted together with the heart sides outward as shown in Fig. 7.

The use of steel beams is becoming popular for girders in connection with wood framing because of the less depth that is required in using them and also for their greater stiffness. Different methods for attaching wood floor joists to them are shown herewith. In Fig. 8 is shown the usual method employed in house construction. A 6-in. I-beam will ordinarily suffice as the girder for any weight imposed on it and the joists are usually framed so that they bear on the upper flanges. It is well to provide a 2x4 nailing piece over the flange which should be bolted in staggered fashion. The floor joists rest on this wood piece and the partition studs are also brought down and toe-nailed to it. This method requires fire-stopping because of the open spaces between the tops of the girders and the under floors and these should be taken care of by the use of a masonry filling or by solid plank bridging cut in between the joists and studs.

If Figs. 4 and 8 are examined together it will be noted that the type of connection between girder and floor joists given in Fig. 8 will allow for equal shrinkage with the method of building the sills in either Fig. 3 or Fig. 4. In both figures you will note that there is a total of 10 ins. of timber to shrink, made up, respectively, of 8 ins., the depth of the floor joists, and 2 ins., the thickness of the sill in one case and the nailing piece on top of the I beam flange in the other. In arranging the bearing for this type of I beam girder on the foundation walls it will be necessary to leave a slot on the inner side of the wall equal to the depth of the I beam for the bearing.

To equalize the shrinkage of floor joists on an interior bearing with the sill construction as shown in Fig. 1 the joists should be framed at the girder as shown in Fig. 9. When larger I beams are required for girders than that shown in Fig. 8 and also when even this projection below the floor joists is objectionable, means must be had of framing the joists into the sides of the I beams.

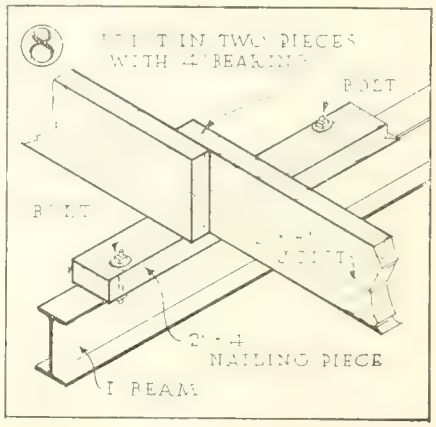
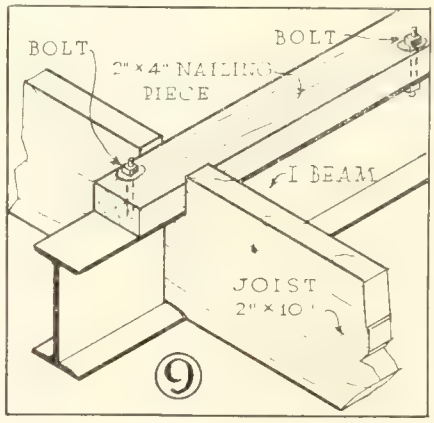


Fig. 9 shows a joist resting on the lower flange, cut so that it fits around the upper flange and the nailing block which is placed on top of the flange. This connection is satisfactory for light loads but its weakness lies in the small amount of bearing which the flange of the I beam provides. To overcome this difficulty wood strips, 3x4, should be bolted to the sides of the I beam, resting on the lower flange as shown in Fig. 10, and these strips will then provide sufficient bearing for the joists as in the case of the wooden girder shown in Fig. 6.



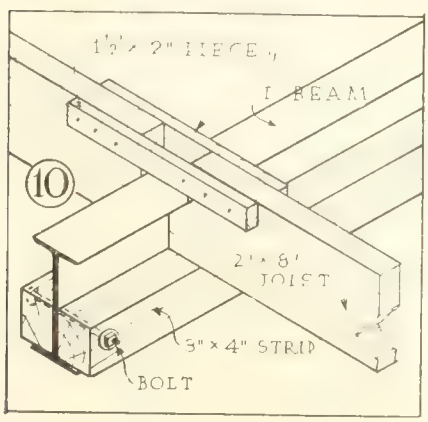
A better form of supporting the floor joists is shown in Fig. 11, in which case a small angle iron is bolted to each side of the web of the I beam to provide the bearing instead of the wood strip. This angle may be reversed as indicated in Fig. 11A.

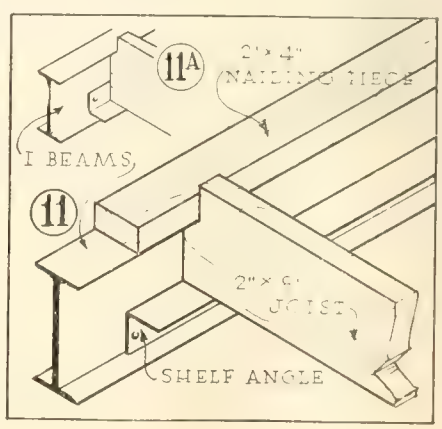
In heavier wood construction, such as is employed in mill buildings, floor joists that are framed flush with girders are generally required to be carried by hangers and now, in most cities, header beams exceeding 4 ft. in length must be supported in the same way.

In framing wood joists into steel girders the tops of the joists and the girders should never be flush; the wood joists should always be somewhat above the top flanges in order to allow for the natural shrinkage of the wood, otherwise there will be a high place in the floor over the steel girder. This can be arranged by using a nailing strip, as in Fig. 9, which also provides a sole for the partition studs and allows the joists to be staggered, but another means is shown in Fig. 10 where the joists come opposite one another when small strips about 1 1/2x2 may be nailed across the top of the flange tying both joists together and providing a nailing strip for the floor. This is customary where no partition is to be built over the girder.

In general it may be said that deep girders are more economical than those which are shallow, and that when they are arranged to be nearly flush with the top of the joists special fire-stopping is not necessary.

The contractor should keep well in mind that when stud-bearing partitions are to be placed on the girders to support a second floor the shrinkage for this floor must be taken care of, and he should use the type of girder which tends to equalize this. Figs. 3 and 8 show respectively the sill and girder of what is known as the Western or "platform" frame which is a modern development of house construction tending to adjust the shrinkage between the outside and inside bearings. This will be given detailed consideration in a later article dealing with the complete house framing.





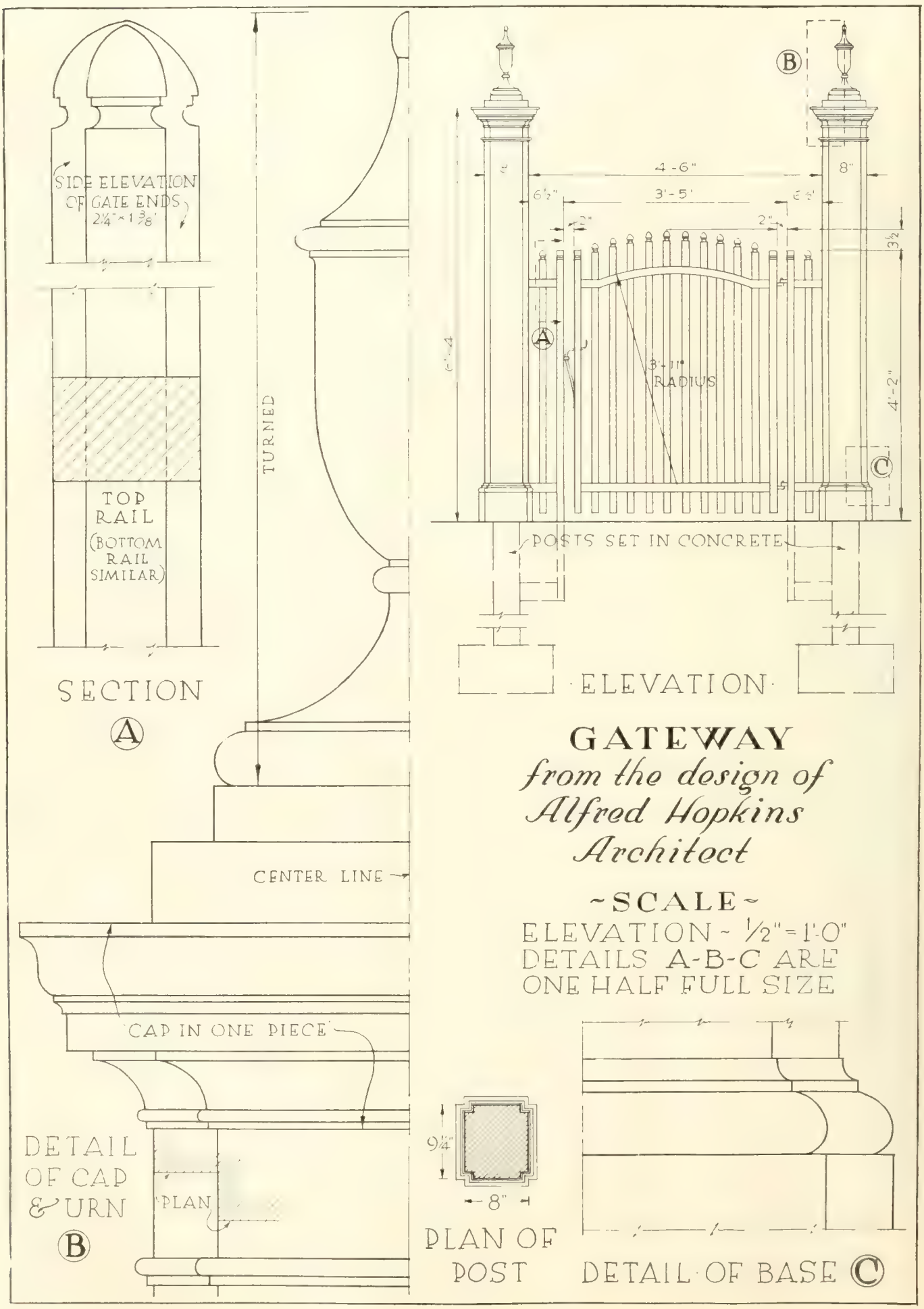
SHOPWORK *and* FURNITURE

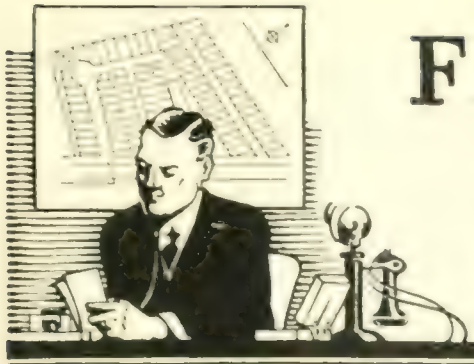
Designs for the Finish Man

A Colonial Gateway

With special drawings from the design of Alfred Hopkins, Architect

THE greater attention people gave to their gardens that has brought the hedge and gate into popularity again because they give privacy. With a colonial house the finishing touch may often be given with an entrance gate set between hedges as shown here. The design of these gate posts is excellent colonial and they could be adapted to a wide variety of uses such as the screening entrance to a laundry yard enclosure, a garden screen, etc., where good appearance is an important consideration. The details on the next page give complete data for their construction. Note that cap is made in one piece.


SIDE ELEVATION OF GATE ENDS 2¼" × 1⅜"
TOP RAIL (BOTTOM RAIL SIMILAR)
TURNED
SECTION Ⓐ
CENTER LINE
CAP IN ONE PIECE
DETAIL OF CAP & URN Ⓑ
PLAN
Ⓑ
4'-6"
3'-5"
8"
6½"
2"
3½"
6'-4"
Ⓐ
3'-11" RADIUS
4'-2"
Ⓒ
POSTS SET IN CONCRETE
ELEVATION
GATEWAY
from the design of
Alfred Hopkins
Architect
~SCALE~
ELEVATION ~ ½" = 1'-0"
DETAILS A-B-C ARE
ONE HALF FULL SIZE
9¼"
8"
PLAN OF POST
DETAIL OF BASE Ⓒ



FINANCE and REAL ESTATE

Helpful Data for the Builder Who Builds to Sell

The Business of Speculative Home Building

I. The selection and improvement of land for suburban development

By C. Stanley Taylor, Associate Editor

It is the purpose in this series of articles, which will run through a number of issues, to give a concise detailed account of the many problems entering into speculative home building. Mr. Taylor's wide experience in real estate development work insures a treatise of special value. The next article of the series will be published in the May issue and will deal with the selection of land for city homes.

IN selecting the real estate for the building of suburban homes on a speculative basis one of two methods is usually followed: (a) to purchase lots in suburban subdivisions or developments where land improvements are in, or (b) to carry out the construction of houses as part of a program of suburban development subdivision project. From business viewpoints there are valuable considerations in both methods which we will outline briefly.

It is a well established fact that the construction of dwellings in any suburban development tends to increase the value of all surrounding land. Real estate developers have recognized this fact in the last two years to a greater extent than ever before. Consequently the builder who intends to construct several houses on a speculative basis is in a position to arrange a particularly favorable building transaction with the owner of such a development. In some instances lots are to be had at practically no cost, or at a very low cost and on favorable terms. Usually the land owner is willing to sell the lots in consideration of a second mortgage placed on the houses to equal their value, thus leaving the builder with free and clear land in order that he may arrange his building and first mortgage loans.

In selecting lots from subdivisions where street improvements have already been put in, the prospective builder should take carefully into consideration the various factors which will bear directly on the sale of his houses when they are completed. These include:

1. Transportation cost and time to important industrial and business centers from which commuters will logically be drawn.
2. The actual cost of the improved land which should in no case exceed 20% of the cost of the dwelling which is contemplated.
3. The logical general character of the community, indicating the type of people who will be drawn to this residential section.
4. Existing and future community facilities such as stores, schools, churches, country clubs and similar centers.
5. The walking distance from transportation which should in no case exceed 10 minutes.
6. The present physical conditions between transportation points and the property. If it is necessary to pass through an unsightly section of a town, through a factory district or by any unpleasant occupancy, the potential sales value of the houses is greatly reduced as a bad impression is created on future purchasers.
7. Restrictions. The average suburban development carries with the sale of lots certain restrictions as to setbacks, occupancy and types of dwellings which may be constructed. The builder who is buying lots for speculative building should consider these restrictions carefully, to make certain that they will maintain a good residential character, and not allow nuisances which might ultimately detract from the value of the property.
8. The attitude of loaning institutions or sources of building loans should be considered. It will be found sometimes that, due to over-building or some form of unpopularity, loaning institutions refuse to go into certain suburban areas.
9. Availability of local labor and building material supplies.

Other points affected by local conditions will naturally occur to the average buyer, but the condition will indicate the character of precaution which should be taken in purchasing land in existing subdivisions.

While it is true that the cost of residential construction is decreasing somewhat, it is still evident that if any form of profit other than that realized directly from the sale of the house can be employed as an incentive for speculative home building, considerable interest will attach thereto. It would seem, therefore, that with the knowledge that the building of houses increases nearby land values, providing what is known as an increment in land value, the wise speculative builder operating in the suburbs will take advantage of this fact and go into the operation not only as a builder, but as a land developer. In other words, where land is available at acreage prices, it would seem wise to buy sufficient land to pro-

vide at least four additional lots for every house which is to be built.

The question of laying out acreage into residential lots is one to which insufficient importance has been attached in the average development of the past. The regular "gridiron" form of street locations has, of course, been almost entirely abandoned as it detracts considerably from the attractiveness of the community, and consequently from the sales value of houses and lots. Incidentally, it may be noted that in the average plan the irregular layout, with curving streets and parking spots, creates more square feet of salable property than the straight subdivision. Again, if the property is rolling in its nature it is quite evident that if the streets are scientifically laid out according to the grades of the property, large investment in street improvements may be saved by the avoidance of cutting and filling in grading.

Some Attractive Examples

Accompanying illustrations of two of the subdivisions for the so-called "war villages" will serve to indicate the practical attractiveness resulting from the careful study of land improvement for residential purposes. It may be noted that in the illustration of the Perryville development, where several hundred houses were constructed, the land was practically level except for a wooded ravine in the center of the property which the town planners left as a park and school location. The lot layout in this development allows an average 50-ft. frontage with lots 150 ft. deep for each house, and the streets have been planned to give an even flow of traffic with good vistas from each house.

The layout of the housing development at Sheffield, as illustrated here, shows an excellent example of street planning according to contours. It will be noted by a study of the contour lines that this development is on land sloping toward the river and that all streets are arranged with easy grades to be developed at the lowest possible cost for grading and mechanical installation.

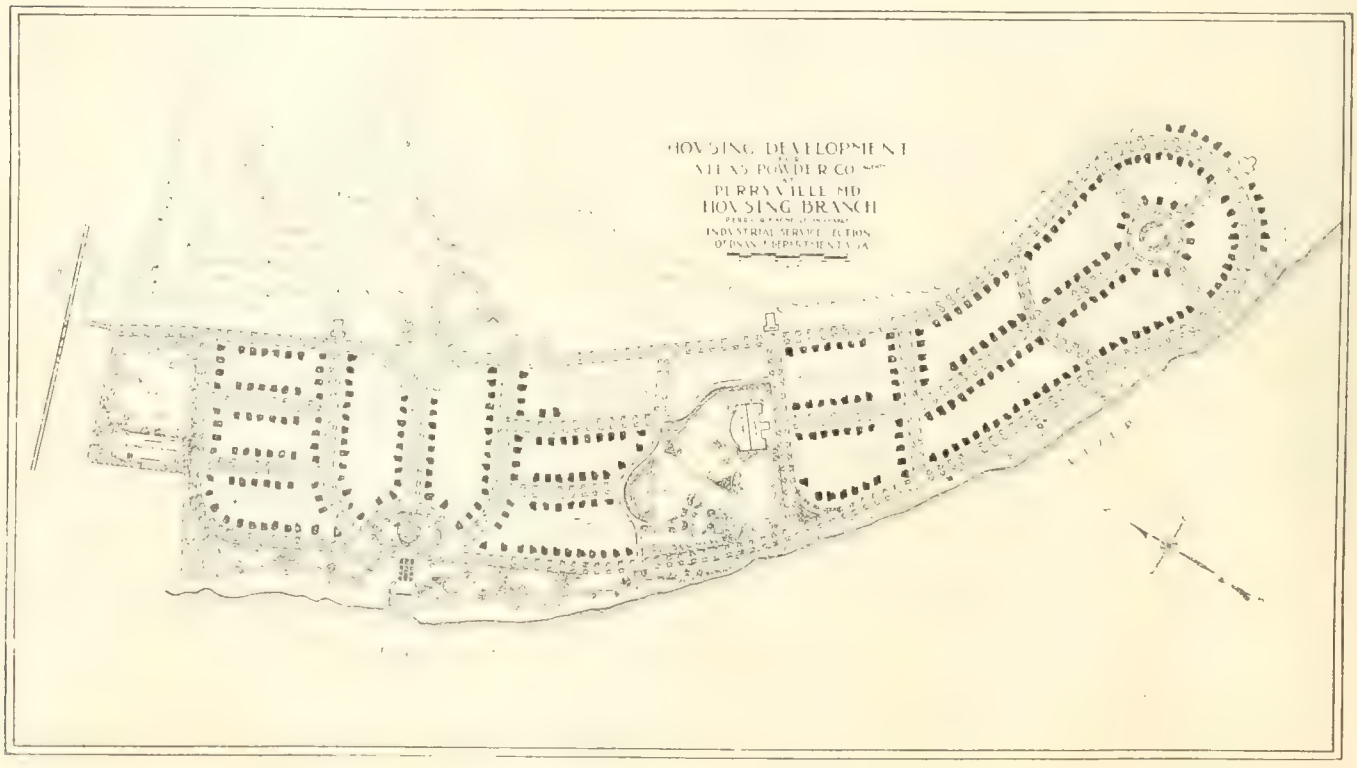
An illustration is also shown covering a suburban housing development for the Nashua Manufacturing Co. at Nashua, N. H. In this case the land is entirely level but its generally triangular shape was taken advantage of by the introduction of a "feeder" street from the main highway, which in turn branches out attractively, avoiding any monotony in the placing of many houses of much the same design. Houses of similar type were furthermore turned to present various elevations, giving the semblance of a number of different designs where, in actuality, only three or four types are used in the entire development.

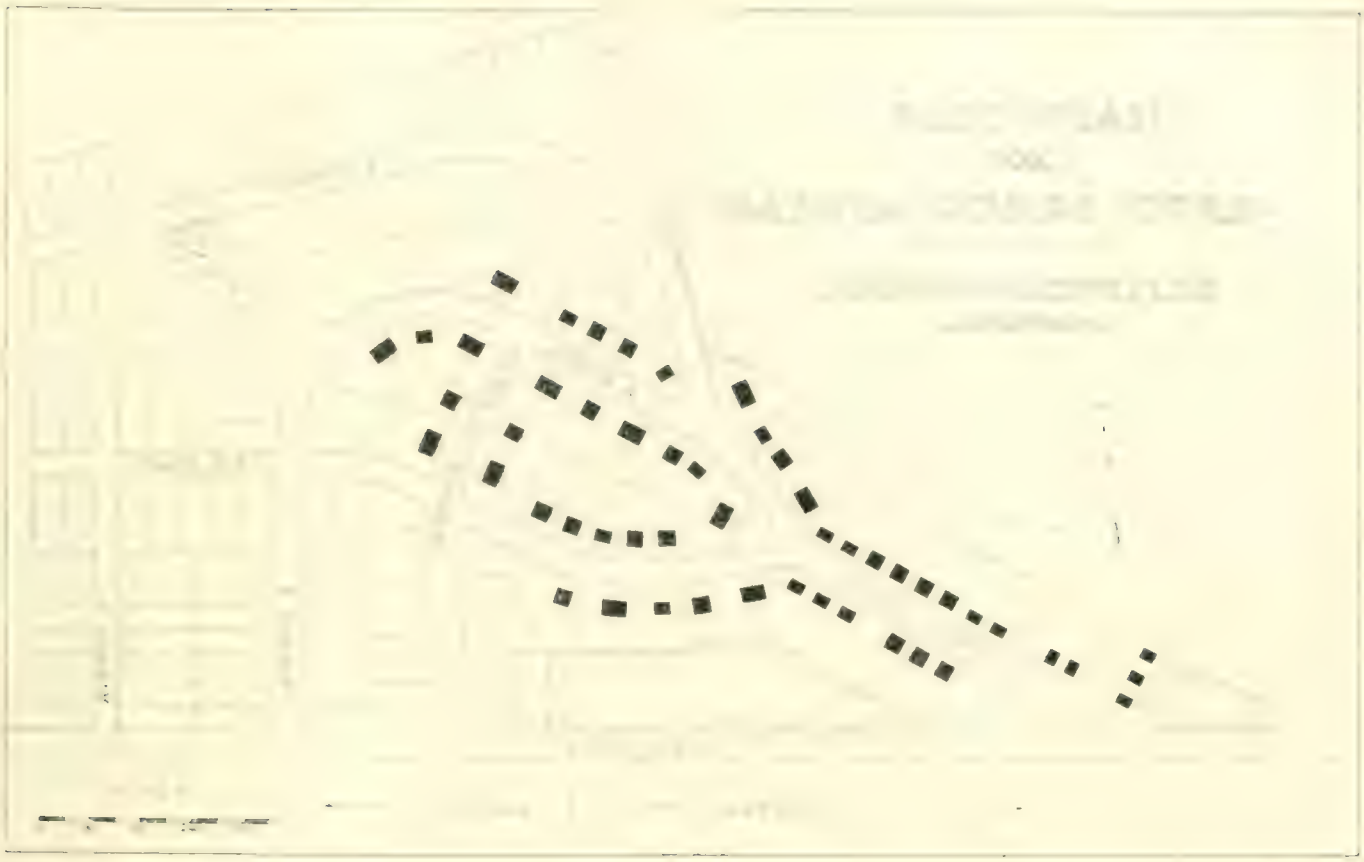
This is a point of which speculative builders may well take advantage as it is known that a considerable saving may be enjoyed through this standardization of plans while variety may be provided both by changing the orientation of the houses and by providing various types of porches and inexpensive exterior changes.

Sizes of Lots

The sizes of lots must be worked out on a sound basis and it is probable that the rule of 20% of the house valuation is applicable at this point. Thus, depending on the cost of land improvement and the original cost of the land, the average size of lots in a subdivision may be determined. For example, in one subdivision the original cost of land, after the street layout has been made, may be found to be $10 a front foot, while the cost of improvements decided upon may be $6 a running foot, the depth of lots being determined largely by local custom together with original cost of land. In this subdivision, therefore, we may say that the average allowable depth of lots is 100 ft. and the cost, with improvements, is $16 a front foot. If the average type of houses to be built here are to cost $10,000 we have, under the 20% rule, an allowance of $2,000

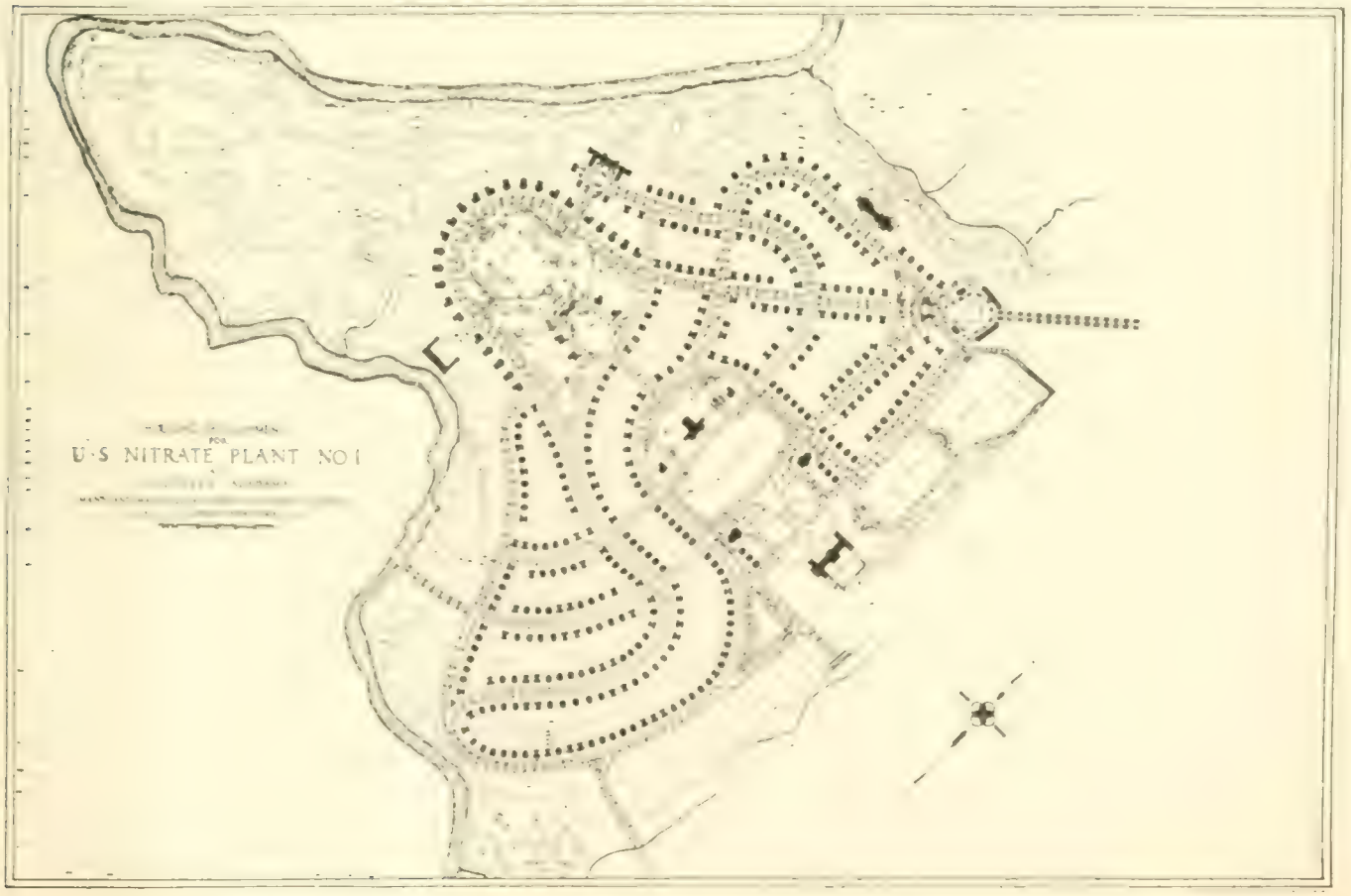
An interesting layout for a narrow plot of land with a ravine in the center, utilized for park space





ABOVE is the layout of a group of houses recently built at Nashua, N. H., for a large manufacturing plant. Note the way in which the new streets lead into the old at the lower part of the plan. The houses are placed attractively.
Mann & MacNeille, architects

BELOW is a larger development for one of the "war villages" in the South. Here the land slopes in bowl fashion and the streets have been arranged in easy curves to do away with steep grades. The houses are shown in solid black.
Mann & MacNeille, architects



for the lot which must also include a profit to the developer which we may place at the rate of $4 a front foot, bringing the total cost to the ultimate purchaser up to $20 a front foot.

It is evident, therefore, that a lot of 100-ft. frontage may be allowed each house in this development where the original cost of land and improvements is comparatively low. On this basis we have worked out the fundamental plan unit for a suburban development of moderate cost homes, each having a large, attractive plot of ground.

These figures may be compared to a subdivision where the original cost of land is higher and the character of improvements may include well finished roads with sidewalks and gutters, and a sewer system which might bring the cost of land improvements and profit up to $40 a foot. Therefore, if $10,000 houses are to be built here it is logical to allow only 50 ft. frontage, bringing the lot cost again to $2,000 and reducing the area by one-half.

Carrying this idea to its extreme, which is to be found in city housing as will be described in a later article, it is evident that in many cases only 20 ft. of land can be allowed for a $10,000 house. Thus we find many city developments tending toward what is known as "row housing", where houses are built in solid rows and with much less depth of lots in order to maintain the proper economical balance between land and building values.

Utility Features

From the investment and sales viewpoints there are also to be considered two important questions—(1) Character of land improvements, and (2) The question of sewage and general utilities. The first important consideration is, of course, the type of road construction to be used for streets in the property. It has been general experience that a good road with grass gutters and perhaps no sidewalks is better from a practical viewpoint than a development in which sidewalks and gutters are included, but having only dirt or poor cinder roads. From the utility viewpoint the idea of building a good road and omitting sidewalks and gutters for later consideration, is sound, but from a sales viewpoint the installation of sidewalks and gutters with rolled cinder roads seems to be the most effective. Perhaps the most practical plan that has been followed is to develop a part of the property with graded roads having gravel or cinder dressing, building sidewalks and gutters only before those lots where houses are to be built immediately. This leaves open the question of ultimate improvements and agreement is usually made with lot purchasers to put in such improvements when lots have been entirely paid for.

The matter of sewer and water is also of great importance. Water mains should be introduced immediately, but as the expense of sewer installation is often prohibitive, or an outlet unavailable, the septic tank, which if properly installed works in a satisfactory manner, will be found the best solution. Individual septic tanks are recommended rather than a larger central tank, as future disputes among property owners may be easily avoided in this manner. Concrete septic tanks which will care for the entire sewage discharge of the average small house are available at a cost of approximately $150 per house, which is much less than that of a sewer system.

The final point of interest is the location of houses which are to be constructed. Some developers contend that houses should be "spotted" over the property in order to give general increment in land value. This is a good idea if a developer has sufficient funds to put in street and utility improvements over the entire property. If this is not the case it is evident that owing to the cost of these installations the first group of houses should be constructed at the entrance to the property and close together to cut down the total number of running feet of road and utility installation required.

Getting Business by Financing

Owners' Construction Corporation extends complete service in financing to home builders

ALMOST every builder is familiar with some phase of this subject. It has been a common experience during past years for a builder to agree to take a second mortgage as part payment for his services, or for a dwelling if he has built on speculation. In many cases he has also helped the client get a first mortgage.

To the average person the arrangements for financing housing construction are comparatively unknown and because of that fact the difficulty about the whole matter is exaggerated and the lack of information often keeps people on a renting basis when in reality they are in a good enough financial position to undertake the ownership of a house. From a business viewpoint, therefore, it is of value to any builder in developing future business to give considerable attention to this question of building finance. With your facts assembled it is not difficult to find individuals, estates and others who are in the market for conservative investments, and who can be interested in building loans because of their generally safe character when secured by good construction well situated as to environment.

Realizing that a construction job depends to a great extent upon the ability to finance it, this idea has been developed to a high point of service by the Owners' Construction Corporation, recently organized in New York, and as the idea has sound business value we describe briefly the method of operation as we understand it.

This company, of which Bert S. Herkimer is President and General Manager, John A. Baldwin and Edwin A. Kingsley, First and Second Vice-presidents, George M. Wood, Treasurer and Myer Efros, Secretary, has really been the outgrowth of a number of years of experience in the speculative building of residences in towns within commuting distance of New York. Among the stockholders are men engaged in almost every branch of the building industry and the directors include officials of loaning institutions who will supply the necessary experience in the way of building financing.

As a result of the knowledge gained in connection with the building and selling of hundreds of homes ranging in price from $4,000 to $50,000 the officers of the Corporation have had long contact with home buyers and have had an excellent opportunity of studying their requirements. In many instances it was found that prospective purchasers had definite ideas about the types of homes which they wanted and were not able to find dwellings already constructed which met with their full approval. This condition, together with the

House in Pelham Knolls, N. Y., a development carried out by Bert S. Herkimer and associates who have formed the Owners' Construction Corporation. Cost about $18,000, exclusive of land. Laurence M. Loeb, architect; Herkimer, Inc., builders

fact that many individuals who wish to own homes do not want to assume the responsibility of building led to the development of the "build to order" policy which the new company has adopted.

Any group of individuals who wish homes constructed, or any individual who wants a house costing upward of $25,000 and who is able to provide 20% of the cost of the operation, is in a position to negotiate with this company for the provision of the necessary 80% balance of financing when a contract is entered into with the Owners' Construction Corporation to carry out the building operation. This is done on either a fixed fee or straight contract basis and operations are to be undertaken anywhere within reasonable distance of New York. The owner may provide his own plans or plans will be drawn for him by the Corporation's architects. Full co-operation is offered to architects who may have plans held up because the owners are not in a position to carry out the financing.

There is considerable merit to this idea where the work is carried out on a reasonable basis of profit. It means that the builder obtains access to certain funds which are available for first and second mortgage loans from interests which place dependence on the workmanship and standing of the builder. A first mortgage of the usual type is arranged, probably with a loaning institution such as a savings bank. This provides at least 50% of the cost of the operation. The owner puts up 20% and from other sources the balance of 30% is secured as a second mortgage of the amortization type, being payable in annual or semi-annual installments over a period of years.

From the builder's viewpoint this is an excellent arrangement because the allowable profit is almost as great as that possible on a speculative basis, but the house is sold in advance and all effort on the builder's part in creating a sale is avoided. From the owner's viewpoint the idea is excellent as long as the builder carries out fully the terms of a proper agreement and the plan possesses several features which are advantageous to him. He has a house built from plans that suit him but he avoids the worrisome details of direct responsibility during construction; he knows what the house will cost *him* before he starts to spend money; he benefits by a liberal financial arrangement and avoids the difficult job of securing first and second mortgage loans; he benefits financially by the elimination of practically all selling expense.

A group of houses built by Bert S. Herkimer and John A. Baldwin at Ridgefield Park, N. J., in 1917 and 1918. Selling prices $6,000 to $10,000

A Way Out for the Speculative Builder

By Ernest Wille

Mr. Wille, a builder of Newark, N. J., who has had wide experience in speculative building, was interested in the suggestion for the disposal of high cost houses which Mr. Taylor made in the January issue and he has favored our readers with the following plan of solving the problem, based on conditions in his locality.—Editors

I AM one of those builders caught between the period of high prices just passed and the "buyers' strike" now on. It is a trying position in which to find oneself, yet I feel confident that sooner or later the "buyers' strike" must collapse, as did the high prices, and it may come just as suddenly. There can be no doubt in the mind of anyone who believes the facts as given out by the authorities, that there is an actual and distressing shortage of houses. The necessity for them is present and will remain so for a long time to come, but the demand for them by actual purchasers, at the present moment, is lacking. As soon as the demand arises again it will result in a return to higher prices for houses that are now being offered at especially low prices.

In all periods of housing shortage it is always the wealthier class, whose demands are for expensive homes, who are first taken care of. Then come those with lesser means who want lower priced houses and so it goes down the line until the humblest cottagers are supplied. There is no relief in sight yet for the latter classes, those of smaller means. I do not think that all people who require 1-family houses, ranging in price from $25,000 up, have been heard from; on the contrary many of these will purchase as soon as conditions have become more normal and the building situation has reached a more stabilized form.

To the speculative builder, who was so unfortunate—as he may think himself—as not to be able to dispose of his buildings erected during the high cost period, I suggest that he sell out at prices based upon the present prices of replacement. If this means a loss let him take it and charge it off his books. A further aid would be to make terms to a purchaser as suggested by Mr. C. Stanley Taylor in his article in the January number of THE BUILDERS' JOURNAL. I cannot, however, quite agree with Mr. Taylor in his brief calculation. The situation of course in the community which he had in mind when making the calculation may be such that the problem cannot be solved in any other way or in the way that I will now suggest.

Building Loan Associations

There is no doubt in my mind that in my community, where building and loan associations are many and flourishing, that on a house of an actual valuation of $12,000 it would be possible to secure $8,000 from a building and loan association on bond and mortgage. Let us assume, however, that only $7,000 could be obtained. This would give us:

Building & loan mortgage	$ 7,000
Cash on delivery of deed	1,000
Balance by second mortgage taken by builder	4,000
Total	$12,000

By securing a building and loan mortgage the purchaser is obliged to pay to the building and loan association each and every month one one-hundredth part thereof, or $70. One-half of this is applied on account of interest and the other half on account of principal of mortgage. In a period of about 11 years and several months the mortgage will be entirely paid off. As the purchaser continues paying to the building and loan association each month the first mortgage is reduced and the second mortgage becomes safer and better. In addition, the second mortgage could be made payable in installments of say $500 at the end of the first year, $500 at the end of the second year and the balance at the end of the third year. This latter payment the purchaser could make by securing an entirely new building and loan mortgage for the unpaid balance of the first and second mortgages. Thus he will have only one mortgage on his property. As to the terms and conditions of this second mortgage, the seller must use his judgment and make such terms as the purchaser will be able to meet. He may be called upon, for instance, to make the second mortgage for a period longer than 3 years.

The purchaser in buying must see his way clear to meeting his obligations every month. In order to help him, and thereby possibly effect a sale, the seller should point out the possibilities of revenue from the property. For instance, in the community where I recently built there is a demand for small private garages. A purchaser could erect 3 garages on the property and these would net him about $25 per month.

I have aided the purchasers in securing building and loan mortgages on the houses I have sold them and have taken back second mortgages as just described. The longest second mortgage is for a period of 3 years and calls for a payment of $400 at the end of the first year, $600 at the end of the second year and the balance of $1,110 at the end of the third year.

"Sit Tight" for Present

Speculative builders of lower priced houses should "sit tight" for the time being, for by doing so I think they will come into their own as soon as the buying movement starts again. The present period of discouragement and lack of confidence will soon give way to clear judgment and renewed courage. I am therefore refusing to rent the houses I recently erected because I want to be in a position to deliver the goods when people again start buying.

Houses which have been erected at the peak of high prices can be replaced today at lower cost. This being so, why should the builder not sell without profit, or even at a loss? Those builders having the higher priced houses on hand must make up their minds to sell at a greater percentage of loss than those who have lower priced houses. I do not think anyone owning a house costing up to $12,000 will have to make any sacrifice if he holds on. I fear that when you go above this price the loss one must bear will be greater in proportion to the increase in the price of the house. The same principle will apply when figuring the other way. For example, anyone now owning a house containing 6 rooms and bath with all improvements and erected at $7,500, including the cost of the lot, during the high price period can under this principle expect a small profit if he waits.

CONTRACTING EQUIPMENT

Reliable Information on Time and Labor Saving Devices

Spray Painting

By Roy W. [illegible]

[illegible]

IT [illegible] the application of paint and other protective coatings by the use of [illegible] method.

The practice [illegible] extended and painting with compressed air and a paint gun requires no introduction to the master painter, the general contractor or the manager. Today all who handle paints, either making, selling or applying, are familiar with operation of spray equipment and the immense saving of labor through the use of the paint gun is self evident.

Observation and experience on many thousands of satisfactory installations have disclosed interesting facts worth noting at this time. The air scheme of painting enables one operator to paint more square feet of surface than 6 or 8 painters using hand brushes, and to secure finished surfaces which are superior to those painted with a brush. Where single-coat work is desired, a lighter or heavier coating can be obtained than is possible with a hand brush. Inaccessible surfaces that are [illegible] brush are rapidly painted, as the paint gun may be quickly mounted on an all metal sectional extension pole whenever the operator wishes to paint a surface beyond his reach. Ceilings and walls up to about 12 ft. in height may be painted without staging and ladder work; the use of scaffolding or staging is reduced at [illegible]. Brush marks, skimped places and laps are entirely eliminated and the covering and wearing qualities of materials are increased. All paints are sprayed to equal advantage at the same consistency as for brush work. Material containers are air tight, which prevents the formation of paint skins, and makes it impossible for dirt to become mixed with the paint.

The next point to be considered is the sort of equipment required for house and building work. The standard [illegible] and used by master painters and general contractors consists of: a portable paint container of 5- or 10-gal. capacity, with control head for regulation of air and paint pressures, this head containing reducing valves; air and paint strainers; pet cocks and indicating gauges; a paint gun of suitable design, with two guns operated from one head, if desired; an all metal sectional

View at left shows ease and speed in **painting factory interiors with extension** rod. Below, note air compressor in foreground, and paint tank

extension pole, and air and material hose in lengths to meet all requirements. A portable compressor outfit, either gas engine or electric motor driven, with air storage tank, necessary gauges and safety valves will complete the outfit.

The approximate cost of painting equipment as just outlined, including compressors, is $500 for a 1-man or $650 for a 2-man equipment. If the compressors were omitted the approximate cost, including extension pole, would be $150 for a 1-man or $210 for a 2-man outfit.

Anticipating questions which will arise in the reader's mind, these questions and answers have been arranged:

What is the loss of paint, using spray method?

None, if handled according to operating instructions.

What is the covering capacity of the spray?

Minimum, 4,000 to 5,000 sq. ft. per 8-hour day; maximum, on large surfaces, 10,000 sq. ft. per 8-hour day.

Common type of paint storage tank and paint gun for spraying

Is the painting of small trim or sash advocated?

No, as it cannot be done to advantage. One man operating a paint gun will keep 2 men busy on trim and sash.

How much air pressure is necessary to operate gun at maximum capacity?

For average work, 50 to 55 lbs. pressure.

Can the spray be regulated?

Yes, it is possible to secure a round conical spray or a broad fish-tail spray, and thickness of paint film may also be easily regulated.

What is the width of the spray?

It corresponds to an 8 or 10-in. brush when the gun is held 6 ins. from surface to be coated.

How is it possible to handle all paints with the same equipment?

By means of interchangeable caps and nose pieces, which have various sized openings.

How are cold water paints, bronze solutions and heavy lead paints kept in suspension?

An air operated agitating attachment is furnished for this purpose.

Will the spray gun clog?

No, if material is properly strained and the gun cleaned after each day's work.

Is it possible to use painting equipment on a windy day?

Yes, by holding gun about 6 ins. from work and working against the wind.

The master painter has been impressed with the fact that the spray method practically creates a new business for him and another excellent reason for his approval is that it increases his volume of work, which means greater profits. The journeyman painter favors the equipment because more work for the master painter means steady employment and also because his occupation has been made much less laborious than with brush work. The public welcomed the method as it enables people to paint at a reasonable price, whereas, if the work had been figured on brush work costs, the cost would be prohibitive.

There is no doubt that many millions of dollars' worth of building failed to receive the customary coats of paint during the recent war period. Much of this neglected work now demands immediate attention if the property is to be saved. New building, which we are sorely in need of, will soon be demanding its share of protective coatings. The field for this invaluable aid to modern building is surely extensive.

Pneumatic painting equipment, one of the newest and most radical developments in the science of painting, has proved its value beyond a doubt.

The cost of repainting old buildings is greatly reduced in using the spray method. Below is shown complete outfit on the job

OFFICE and JOB MANAGEMENT

Things the other man has found out that save money

Methods in Quantity Estimating

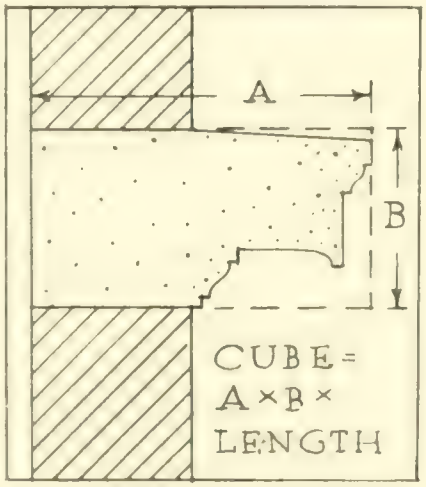
Part X. Figuring and Pricing Cut Stone and Terra Cotta

By Frederick H. Hunter, Quantity Surveyor

THE setting of cut stonework is the item of masonry about which there is the greatest variety of opinion as to the best method to use in handling the quantities for estimating. Every builder for whom the writer has worked has had a different way of handling the matter. No doubt the reason for this wide difference in practice is that the item of stone setting is, in the main, a labor expense. Assume that the contractor is obtaining a sub-bid on the furnishing of the stone, cut to detail, as he should always do if there is much cut stone on the job; we are discussing it here only as a setting proposition. The only material entering into the cost of setting is the mortar, the value of which is small in proportion to the pay of the masons and helpers in doing the work and the expense for derricks or other hoisting apparatus to raise and place the stone.

One employer, in the early days of the building game, used the crude method referred to in a previous article, of figuring the volume of the stone right in with the brick and letting the value of the brick displaced stand for the cost of setting the stone. If, as was sometimes the case, he did not think that this was enough, he would add to the brick price a lump sum which would be his guess of the excess cost of setting the stone over what he had figured for the brick cost. This method probably was well enough on plain manufacturing buildings, the kind of work on which this man specialized. On such jobs the quantity of cut stone was small and of such simple kinds as window sills, grass courses, etc.

Another builder never takes off any quantities for stone setting but, after securing quotations on the stone cut and delivered, simply adds a percentage of the cost of the stone as his idea of the cost of setting the material. In the hands of a shrewd and practical estimator this may be a fair method of arriving at the value of the work but it is hardly to be recommended to



anyone who has not had extensive experience. The writer once pointed out to this man that his method was hardly logical, as for instance, between two kinds of granite, one might be considerably more expensive than the other, to quarry, cut and ship to the job, yet there would be no difference in the cost of setting the two kinds of stone at the job. This builder, however, figuring by a percentage of the stone cost would carry 20 to 30% more for setting granite from quarry "A" than if a different granite from quarry "B" had been specified. Again the price of the stone might vary according to whether the quarry works were full of business or in need of work to keep going when they bid on that particular job. This might make a considerable difference in the size of the sub-bid on the material and hence vary the builder's price for setting the stone. Again, comparing limestone and marble, the difference in cost between these two kinds of material is often 60 to 100%—yet there would be no difference in the cost of setting except that slightly more care would be needed to handle the marble and keep it clean. This method of figuring the cost of setting stone however has two advantages—first, it saves a good deal of time and, second, that for elaborately cut work which has to be handled with special care, this method carries automatically a special amount for setting Of course in any price for setting cut stone there is a certain factor of the cost to cover the chance of damaging a stone so that it will have to be replaced. In this method of pricing the setting, this hazard is taken care of exactly in proportion to the value of the stone handled.

The Boston report prepared by three experienced builders, which has been referred to several times in these articles, recommends that cut stone be reported by the cubic foot. In figuring the cubic feet, however, moulded work, such as a cornice course, is set down as the size of the rectangular block from which such a member would be cut. This gives a good unit for a setting price where the stone is mainly in large pieces, but where there are many light members, such as ordinary window sills or belt courses, this method does not give these a proper value in proportion to heavier stone. A window sill, for instance, that could be cut from a block 6x8, would be allowed, by this system of

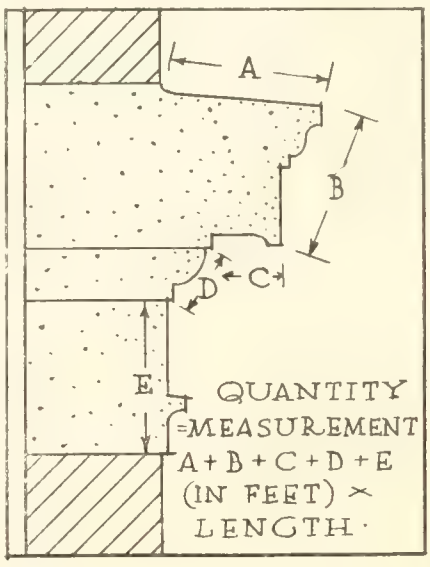
measurement, only one-third as much as a sill of the same length that was cut from a block 12x12. It is evident that it would not be worth three times as much to set the heavy sill as the light sill. The reply urged to this objection is, of course, that a builder before pricing the job would be familiar with the character of the stonework and would take care of an unusually large proportion of light stone on the job by raising his unit price to allow for this. One objection to the "cubic foot" as a stone setting unit is that it involves figuring out a great many dimensions that are fractions of a foot and hence it is a laborious proceeding.

A BETTER method, in the writer's opinion, is a modification of this which was used by a contractor for whom he worked for some years, and who has done a great deal of fine building work. For convenience this contractor refers to his unit of measure as a "setting foot." For the large stone he measures the cubic feet as called for in the Boston report, but for the light members, less than 12 ins. in either dimension, he would take the stone as though a full foot each way, on the theory that there was nearly as much labor cost for setting a light belt course or sill as for a heavy member. This unit certainly gives figures easier to multiply in running out the measurements because for any light stone you simply set down the *length* times 1 times 1. Also, in working from the plans, no measurement except the length of a course need be scaled if you know that the height and depth of the course are each less than 12 ins.

The "setting foot" gives too much value to the lighter courses, but it is, in the writer's opinion, a more practical unit than the "cubic foot". The writer has figured a great many jobs by both methods, in columns side by side, and while in most cases the difference in quantities between "cubic" and "setting" feet will not amount to more than from 10 to 20%, there have been found jobs where there was as much as 40 to 50% difference. We find that more contractors prefer the "setting foot" method than the other.

Quarrymen in figuring their quantities for a cube take the measurements of the blocks as just described except that courses having one dimension less than 8 ins. are figured as though they were 8 ins. thick. If one dimension is less than 8 ins. any other dimension less than a foot is figured as a whole foot. The writer has never known of a contractor using this unit but, on the whole, it seems better than any of those yet met in practice. In a way, it splits the difference between the "cubic foot" method which does not allow enough for light courses and the "setting foot" method which allows rather too much for them.

Still another method of arriving



at a unit for setting stone is used by another firm. They would figure the light sills, belt courses, steps, etc., by running foot as already described in explaining "setting feet", but for cornices or large belt courses, etc., they would take the girth of the stone in front of the wall (as shown in the sketch) and multiply that by the length. This is a somewhat quicker way for large cornices than to figure the stone out course by course in "setting feet" but it does not seem to be so accurate. This method is carried to an absurd result in taking a stone coping course. For this they would measure the girth of the two sides and the top, and multiply by the length thus getting a quantity nearly three times as large as they would for a belt course of the same size where most of the stone was within the wall. The theory back of this method is that the accurate fitting of the stone along the exposed face and the pointing of the joints represent a large factor in the cost of the setting operation. There is some logic in this, but in the author's opinion the quarry man's system of measurement is preferable.

By any of these methods, except that of using a percentage of the cost of the stone as a price for setting,—such items as free standing columns, balustrades, pinnacles, etc., should be handled as separate price items. Any system of measurement that would be proper for ordinary trimming stone would not be enough for such special features. These require special care in setting and protection and the risk of breakage is much greater than for ordinary stone. The best way is to price such special features one kind at a time and set down a lump price per column, per baluster, etc.

For ashlar work of cut stone there is general agreement that the quantity reported should be the area in surface feet with a description of the thickness, as "Granite ashlar 4" and 8" courses, 900 sq. ft." This would mean that the courses of stone were alternately 4 and 8 ins. thick, or an average of 6 ins. One should include in measuring the ashlar, jambs, sills and heads if these are plain and less than a foot in depth. If these pieces have any projection from the line or carry any mouldings more than a quirk on the angle they should be counted in with the trimming stone. Of course, if the sill, jamb and head of the window or door are to be taken in thus as general stone, the out for the opening, in figuring the ashlar surface, should be measured to the outer joints of these stones. For the jambs this will probably mean an average width, as the jamb stone will bond into the ashlar in alternate courses.

THE setting of cast stone would be figured in the same way as for natural stone. It may be that the cost of setting the artificial stone would be slightly less than for the natural stone because it would come in larger units, but this is a point which would affect the unit price to be figured rather than the quantities. There are, however, a few points of difference between artificial and natural stone which an estimator should bear in mind. In cast stone the lintel sections are frequently thicker than for natural stone because if the natural stone is to span over a wide opening it is usually supported from behind by a steel lintel, whereas an artificial stone lintel would have reinforcing rods cast into it, making it a structural beam, and it could extend back the full thickness of the wall to carry the masonry above the opening and no lintel of structural steel would be needed. There should

be determined, the plans giving a section of a typical [illegible] should settle this point. As a result of this difference the quantities of cast stone are frequently slightly more than they would be for natural stone for the same building. Also cast stone can be made in shapes that could not be cut in real stone; hence cornice members are often in larger pieces if of cast stone than they would be otherwise.

The setting of architectural terra cotta, which is frequently used in place of stone for trimming, is taken off in practically the same way as stone. Terra cotta, of course, comes in much smaller units than stone and can often be carried and placed by hand, thus saving the expense of a derrick. However, because there are so many more pieces in the same cubic quantity it takes more labor by the masons to set it than it does for stone. The cost of pointing also is very much more. A window sill in stone is ordinarily in one piece, but in terra cotta it is usually in three to five, or even more pieces for a large opening.

Terra cotta is made hollow in the back, the top and bottom members of the piece being supported at intervals by intermediate web walls dividing the hollow into several smaller cells. In setting terra cotta it is always required, on good work, that the cells in the back of the blocks be filled with brick. This is a fussy job, requiring a lot of cutting and fitting. In figuring the brickwork for a job where terra cotta trimmings are used, one does not take out the entire space occupied by a window sill or lintel as one does where such a member is of stone. To allow one-quarter or perhaps one-third of the volume of a terra cotta sill with the out is quite enough because, while perhaps not more than one-half of the space of the terra cotta will actually be filled by brick, so many brick will be wasted in chipping and fitting that only a quarter should be taken out.

Terra cotta cornice members are usually not filled with brick, as they are fastened to steel out-riggers by hangers and straps of light iron. This makes the volume of terra cotta [illegible] considerably less than the volume of the stone would be for the same design. Usually the brick wall extends up behind the cornice as a support and anchorage for the steel out-riggers. The quantity of terra cotta will usually amount to less than stone would figure to carry out the same design, but the unit price for setting the terra cotta would be more and, as already explained, the quantity of brick to be figured would be considerably larger. In figuring terra cotta be sure whether the setting irons—anchors, hangers, etc.—are included in the bid for furnishing the material. Many a mason has been stuck for the cost of these ties and anchors, which are very different from the simple anchors used in setting stone.

A Modern Concrete Bungalow

Six-room house built along popular lines, with walls of concrete structural tile

THE house shown in the accompanying illustration is square in plan, [illegible], with a roomy living room and front porch. Of particular interest is the construction method. Excavation was carried below frost and footings constructed of concrete placed in forms. Above this point the walls are of concrete structural tile, serving as a base for two coats of Portland cement stucco. Porch balustrades, steps and floors are of concrete. The roof is of frame construction covered with shingles of prepared asphaltic material. The chimney is of concrete tile and stucco, lined with hard burnt clay.

Walls, porches and chimney required about 2,500 tile, each tile being 7 x 24 in face area, with thickness varying from 7 to 10 ins. as required to carry the load. The tile used are of the triple air space type, specified especially so that plaster could be applied directly to the tile without the necessity for furring and lathing, as required for brick and single air space type of concrete block. The side walls above the eaves are of frame, on which asphalt shingles were placed.

Concrete structural tile is a development of concrete block and has many features to recommend it. It is made by several different machines now on the market, and differs from the usual concrete block in having thin walls with a triple air space that provides continuous openings through the center of the wall, both vertically and horizontally. This makes the block light in weight, easy to lay, and furthermore makes interior furring and lathing unnecessary. It is frequently laid without mortar, the center air space being filled with grout. The continuous air space affords also an easy way of placing reinforcing rods when they are necessary. In the illustration below the house is shown with side wall ready to receive the stucco and front with first coat of stucco applied.

Current Notes

(*Continued from page 6*)

Building in Savannah May Not Equal Last Year's Record

MORE than $4,000,000 worth of construction was completed in 1920, according to the Mayor of Savannah. At this time the prospect is that this record will hardly be equaled this year, though there is a feeling among contractors and the general public that there will be a building revival in the spring. An annex of more than 80 rooms to the Hotel Savannah has just been completed. The Artley Company is pushing work on the new high school building, a job of about $400,000, which is the largest and most important work now being done in this city. The Savannah Coal & Dock Company is constructing large coal docks at the Port Wentworth terminals, 4 miles up the Savannah River. This will call for the expenditure of some $3,000,000. The docks and loading chutes will have a capacity of from 3,000,000 to 3,500,000 tons a year. The contract is in the hands of A. Bentley Sons & Co., of Toledo. The construction of these docks gives emphasis to the importance of Savannah as a place of export.

The completion of the Centennial flour mill, a flour mixing plant, adds a new industry for this port. The Centennial Company owns a string of flour mills in the wheat belt and export plants at Seattle and other Pacific ports. The mills at Savannah will supply domestic trade in the southeastern territory and the export trade to Cuba and South America. (*J. H. Reese, Secy. Builders' Exchange, Savannah, Ga.*)

Richmond, Va., Builders' Exchange Working for Home Industry

WORK of considerable importance is being taken up by the Builders' Exchange in reference to the preparation of specifications and the awarding of contracts, especially those for public work. At a recent meeting of the Exchange, the Board went on record as being in favor of all public work being performed by local concerns, as far as practicable and consistent with the best interests of the city. The Exchange is working with the idea in view of having all work of a public nature given out on a competitive basis, including the drawing of the plans, the general contract, sub-contracts, etc. Committees have been appointed to take up each phase of this work. The object of the Exchange, in this connection, is to foster home industry and promote a spirit of healthy competition in the securing of building contracts, each general contractor and sub-contractor to stand strictly on his merits.

Indications show an improvement in the building situation in Richmond during the month of January, 1921. While practically all 1920 building projects have been completed, the outlook for 1921 is exceedingly bright. Several big apartment houses are under construction, and there are others that will be under way in the near future. There are a few houses being built at this time, but the majority of home builders are holding off for further declines in material prices.

The erection of about 30 stores is contemplated by one concern, operating what are known as the Piggly-Wiggly chain stores. The cost of these stores will amount to about $450,000 and the work will be started within a short time.

The Liggett & Myers Tobacco Company has filed plans for the erection of the second unit of its plant here. The work of rebuilding this large plant was begun in 1920, one unit of which has been completed at a cost of about $400,000. As rapidly as one unit is completed, under present plans, a new unit will be started and the old buildings torn down until the entire block is completed. The new units will be 5 stories high and of modern concrete and steel construction.

The Brick Contractors' Association put in effect on February 18, 1921, a new schedule of wages for bricklayers of $1 per hour. This is a decrease of 25c.

Building material dealers report bright prospects for the coming year. Inquiries on the prices of materials are numerous and prices are gradually coming down, showing a decrease of 10 to 15% as compared with the prevailing prices during December, 1920. The prices of building materials as compared with January of last year are slightly higher. (*R. L. Shotwell, Builders' Exchange, Richmond, Va.*)

Growing Optimism in Detroit as Factories Re-open

AN optimistic note relative to building operations in Detroit this year has been sounded by John C. McCabe, Commissioner of Building, who reports that in 1919 building construction in Detroit aggregated $83,000,000, in 1920 $77,000,000, and that prospects were favorable for surpassing these totals in 1921.

The anticipations of the Fourth City are based largely on the projected and essential construction of hospitals, schools, numerous municipal buildings, thousands of residences and apartments, as well as on the indications shown by building permits issued and a belief in a rapid revival of general industrial progress.

The problem of both home builder and factory head, in many instances, is one of finance. Local bankers admit that they are reluctant to tie up funds for long terms in the face of constant withdrawals by depositors and with but little coming in. In brief, the general contraction of business, causing a restriction of credits, bears strongly against loans for building purposes because of the long term tie-up of funds involved. Loans that are made in Detroit, however, are mostly at 6 and 7%, without any bonus attachment. Against this drawback is the noticeable, increasing "shopping" to architect, banker and contractor by prospective builders.

That 3,333 deeds were recorded in Detroit in January and 3,111 in December, 1920, seems proof of the confidence of the purchasers, and banks are showing their confidence by proceeding with the erection of numerous branches.

Detroit architects see a good year ahead and contractors are urging an early start of home building—30,000 homes being the present announced requirements—while they can figure close with materials at low tide figures and labor plentiful. Lumber dealers report preparations for a big year in Detroit and throughout the state, and they predict an increased building activity which will rise to material supply and man power capacity, and so carry on uninterruptedly for a long period. In 1920 building started off with a boom and gradually fell to almost zero. This year, contractors assert, the greater activity will come during the latter months of the year.

Another dependable reflector of the building status in Detroit is the city's record of permits for building. The totals for January were 508 permits, new work $3,095,964 with 305 additions to cost $885,979, the largest item being an 18-story office structure of reinforced concrete to be erected for the Stroh Products Company at an estimated cost of $1,100,000. In construction cost these totals are one and three-quarter millions less than in 1920. Permits for residential construction in January this year represent about 33% of the total. Permits issued for the first week in February aggregated $763,360 compared with $522,380 for the same week last year. Dealers say an average of 30% under a year ago obtains in building material prices here, with the exception of structural steel. They maintain, however, that the price tendency will be upward from now on, due in part to increased freight rates and partly because of the demand for material, together with an expected high level of labor cost. The freight rate difference in lumber alone amounts to about $5 a thousand.

The Employers' Association of Detroit, in a survey of industrial conditions early in February, reported the number of men employed by Association concerns as 25% of the number a year ago. The Association includes 79 firms and it is calculated that they employ two-thirds of the working population of this city. There are at present some 57,000 men working for these concerns. The report also asserts that 30% of the men laid off during Christmas week have been re-employed. There is little talk of reduction of pay for skilled labor, but there is talk of greater efficiency being required which, in some lines at least, may serve the same purpose and with greater satisfaction generally.

The greater number of Detroit's temporarily unemployed, however, have evidence of their frugality during good times in the form of substantial bank accounts, and thousands of this class will be among the home builders this year. (*G. L. Stryker, Detroit, Mich.*)

New York Passes Tax Exemption Ordinance

THE seriousness of the housing shortage has been receiving attention in New York for some time but the first definite step toward creating better conditions has just been taken. The Board of Aldermen has passed a resolution calling for a $5,000 exemption of taxes on house construction. The exemption applies also to apartment house construction at the rate of $1,000 a room up to 5 rooms. The exemption period is 10 years and all houses built in the year beginning April, 1921, will benefit. This, in the course of 10 years, means a saving of 20% to the home owner and it is expected that it will be a stimulant for immediate construction, especially of small houses in the outlying residential areas.

WHAT'S NEW

New Materials and Equipment that Keep Your Work Up to Date

A New Automatic Meter-Pump

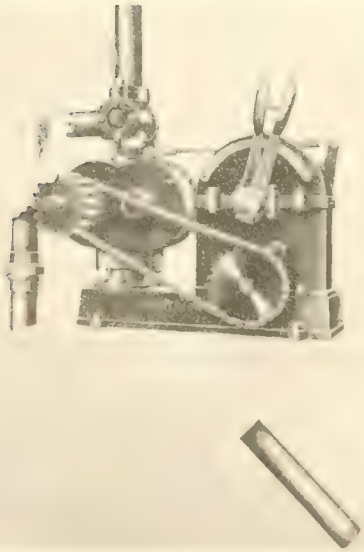
THE Austin Machinery Corporation of Chicago reports the successful conclusion of a series of tests preliminary to placing on the market their new Automatic Meter-Pump.

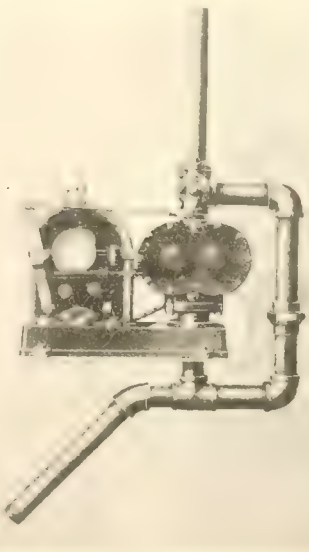
This novel device, as its name implies, measures the water discharged into concrete mixers and paving machines. It insures a uniformly accurate quantity for each batch.

Simplicity is its main characteristic—it is surprisingly simple in both construction and operation. Setting a pin for the exact quantity of water required takes but a moment, and then no more attention is required until the job is done, except, possibly, to move the pin a hole or two to offset any variations likely to occur in the moisture of the ingredients.

The pump is driven from the mixer shaft and it works continuously. The two-way valve is "opened" and "closed" by means of a cam on the timer controlled by the starting lever. When the valve is "open" the water is discharged into the mixer; when "closed", it circulates through a return loop in the pipe.

The operator "opens" the valve by throwing the starting lever over to the timing pin; then he forgets it until the next batch is ready for water. The valve "closes" itself automatically at the precise moment the pre-determined quantity of water has been discharged.

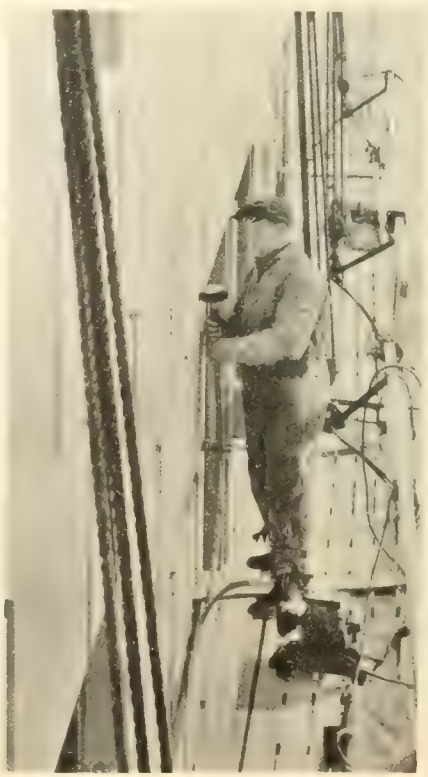




A Wire Scratch Brush

THE R. G. Haskins Company, Manufacturers of Portable Electric Machinery, 27 South Desplaines St., Chicago, are making a wire scratch brush which is being extensively used. This brush is useful for many widely different purposes; it is of value in cleaning down the surfaces of stone buildings to remove any marks or discolorations which have been left by the workmen, and it is much used for cleaning off form marks.

This illustration shows the use of the equipment on the stone exterior walls of the Hanna Building in Cleveland. Four of these machines were used, each cleaning, on an average, 520 sq. ft. of surface per day. The contractor estimated that these machines performed work which would normally be done by 16 men.



If Your Time Is Worth $1 an Hour or More —by All Means Get This Book

Second Edition Revised and Improved

The approaching era is one of BRICK Construction — Are You Prepared?

How much cement and lime are required for mortar to lay 1,000 bricks? How many hours' time is required to mix it?

How is a window frame set in a

This book tells you all these things and many more. It is a complete brick residence construction. It goes into detail and shows, step by step, how to figure brick costs.

Complete estimating tables so that the number of brick, amount of material for mortar of any mixture, hours of bricklayers' and laborers' time and area of wall up to 10,000 square

6 Full Page Architectural Detail Drawings

builders. Small contractors, big construction companies and architects have written to express their appreciation of this book. We are so sure you will like this book that we will gladly refund your money if you are not

"BRICK For the Average Man's Home" is another very helpful book. Various Builders have told us it assisted them to secure contracts. Shows 35 attractive Brick homes, for each of which *working drawings are available*. Floor plans, interiors, details, material estimates. Sent postpaid for $1.00. Send $1.25 and get both books.

The Common Brick Industry of America
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Cleveland, Ohio

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Selected List of Manufacturers' Literature

FOR THE SERVICE OF BUILDERS, CONTRACTORS, ARCHITECTS AND ENGINEERS

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to The Builders' Journal, 142 Berkeley Street, Boston, Mass., or the manufacturer direct, in which case kindly mention this publication.

Listings in this Department are available to any manufacturer at the rate of $5 per listing per month.

BOILERS—See Heating Equipment

BRICK

American Face Brick Association, 1151 Westminster Bldg., Chicago, Ill.
- The Story of Brick. Booklet. 7 x 9¼ in. 55 pp. Illustrated. Presents the merits of face brick from structural and artistic standpoints. Tables of comparative costs.
- The Home of Beauty. Booklet. 8 x 10 in. 72 pp. Color plates. Presents fifty designs for small face brick houses submitted in national competition by architects. Text by Aymar Embury II, Architect. Price 50c.
- A Manual of Face-Brick Construction. Booklet. 8½ x 11 in. Textbook on construction of the brick wall and various uses of face brick. 31 colored plates of brick houses with plans. Price, $1.00.

Bradford Brick Co., 2 Main Street, Bradford, Pa.
- "Red" Catalog. 7⅝ x 5 in. 30 pp. Illustrated. Covers dry pressed and impervious smooth-faced brick.

Common Brick Manufacturers Association of America, 1309 Schofield Bldg., Cleveland, Ohio.
- Brick for the Average Man's Home. Book. 8½ x 11 in. 72 pp. Color plates. Book of plans for bungalows, houses and apartments for which working drawings are available. Price $1.00.
- Brick—How to Build and Estimate. Book. 8½ x 11 in. 48 pp. Illustrated. A manual for the brick builder on estimating and details of brick construction. Price 25c.

BUILDING STONE.—See Stone, Building

CEMENT

Carney's Cement Company, Mankato, Minn. Booklet. 8 x 10 in. 20 pp. Illustrated. Complete information on product, showing prominent buildings in which this cement has been used.

Sandusky Cement Co., Dept. F, Cleveland, Ohio.
- Medusa White Portland Cement, Stainless. Booklet. 8½ x 11 in. 48 pp. Illustrated.
- Medusa Waterproof White Portland Cement. Booklet. 6 x 9 in. 32 pp. Illustrated.
- Medusa Review. 6 x 9 in. 18 pp. Illustrated. House organ issued bi-monthly.

CONDUIT

National Metal Molding Co., 1113 Fulton Building, Pittsburgh, Pa.
- Bulletin of all National Metal Molding Products. In correspondence folder. 9½ x 11½ in.
- Sherarduct. Circular. 5 x 8 in. Illustrated.
- Flexsteel. Circular. 5 x 8 in. Illustrated.

CONSTRUCTION, FIREPROOF

Bostwick Steel Lath Co., The, Niles, Ohio.
- After The Fire. Booklet. 6 x 9 in. 13 pp. Illustrated. Showing the fire-resistance of Bostwick "Truss-Loop."

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
- Standard Fire Proofing Bulletin 171. 8½ x 11 in. 32 pp. Illustrated. A treatise on fire proof floor construction.

Northwestern Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
- Fireproof Construction. Catalog. 6 x 9 in. 72 pp. Illustrated. Handbook of practical suggestions for architects and contractors. Describing Nemco Expanded Metal Lath.
- Fire-proof Construction. Handbook. 6 x 9 in. 72 pp. Illustrated. Describing Kno-Burn expanded metal lath.

DAMPPROOFING

Truscon Laboratories, The, Caniff Avenue and Grand Trunk R. R., Detroit, Mich.
- Truscon Stonetex. Booklet. 5 x 8 in. 36 pp. Illustrated. A booklet telling of methods to decorate and make brick, stucco and masonry free from stains by the application of a cement coating.

DOORS, WINDOWS AND TRIM, METAL

Dahlstrom Metallic Door Company, 425 Buffalo Street, Jamestown, N. Y.
- Architectural Catalog. 10 x 14 in. 46 pp. 11 sections. Illustrated. Catalog showing our regular styles and types of hollow metal doors and interior trim. Various types of frames and other architectural shapes also illustrated.
- Architectural Portfolio. 14 x 18 in. 30 pp. Illustrated. Portfolio of various designs and types of Dahlstrom doors. Drawings and details of each style or type. This is only sent free to reliable architects.

DOORS, WINDOWS AND TRIM, WOOD

Detroit Steel Products Co., 2005 East Grand Blvd., Detroit, Mich.
- Fenestra Sidewall Sash. Catalog 8½ x 11 in. 24 pp. Illustrated. Details of construction, installation and layout of Fenestra Solid Steel Sash.
- Fenestra Underwriters' Sash Catalog. 8½ x 11 in. 20 pp. Illustrated. Details of construction, installation and layout of sidewall and counterbalanced sash as labelled and inspected under the supervision of the Underwriters' Laboratories, Inc.

DUMBWAITERS

Kaestner & Hecht Co., Chicago, Ill.
- Bulletin 520. Describes K. & H. Co. electric dumbwaiters. 8 pp.

Sedgwick Machine Works, 151 West 15th Street, New York.
- Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¼ x 8¼ in. 60 pp. Illustrated.

ELECTRICAL EQUIPMENT

Electric Boiler Corporation, Cambridge, Mass.
- Electric Boilerette. Booklet. 5 x 7 in. 18 pp. Illustrated. Describing an electrically-heated and automatically-controlled water-boiler for homes, offices, barber-shops, etc. Made in sizes from five to one hundred gallons capacity.

General Electric Co., Schenectady, N. Y.
- G. E. Specialty Catalog. 3¼ x 4½ in. 210 pp. Illustrated. Pocket size descriptive booklet with cloth binding. Gives dimensions, catalog numbers, capacities, package weights, etc., of a complete line of essential wiring devices.
- Novalux. Booklet. 8 x 10½ in. 36 pp. Illustrated. Ornamental street lighting units.
- Standard Unit Switchboard Panels. Booklet. 8 x 10½ in. Illustrated. An index to types of standard unit panels for large and small plants, alternating current and direct current, giving references to descriptive bulletins on each type.

Habirshaw Electric Cable Company, Inc., Yonkers, N. Y.
- Plans and Specifications for the Home Electrical. Catalog. 11 x 14 in. 20 pp. Rubber, oiled paper, varnished cambric insulated wires and cables for every condition of service.

Kohler Co., Kohler, Wis.
- Kohler Automatic Power and Light 110 Volt D. C. Booklet. 5 x 7 in. 32 pp. Illustrated. Describes a standard voltage automatic, electric power and light plant for isolated homes.

Adam Electric Company, Frank, 3650 Windsor Pl., St. Louis, Mo.
- The Answer to the Tenant Meter Problem. Booklet 6 x 9 in. 8 pp. Illustrated. Describing the Frank Adam Meter Control Panel Boards and Cabinets which are designed especially for the increase or the decrease of the tenants' requirements in the building.
- The Floor-Box With the Reversible Cover. Circular 3¼ x 6¼ in. 8 pp. Illustrated.
- Frank Adam Hanger Outlets. Circular 3½ x 6¼ in. Illustrated.

Simplex Wire & Cable Co., 201 Devonshire Street, Boston, Mass.
- Simplex Manual. Catalog and reference book. 6¾ x 4¼ in. 92 pp. Contains in addition to information regarding Simplex products, tables and data for the ready reference of architects, electrical engineers and contractors.

ELEVATORS

Kaestner & Hecht Co., Chicago, Ill.
- Bulletin 500. Contains 32 pp. Giving general information on passenger elevators for high buildings.

Otis Elevator Company, 11th Ave. & 26th Street, New York, N. Y.
- Otis Push Button Controlled Elevators. Booklet. 6 x 9 in. 56 pp. Illustrated. Detailed description of Otis Push Button Elevators. Their uses in residences, stores, institutions, apartment houses, business offices and banks, etc.
- Otis Gravity Spiral Conveyors. Booklet. 6 x 9 in. 56 pp. Illustrated. Gravity spiral conveyors for lowering packaged merchandise, boxed, cased and bundled goods in factories, warehouses, terminal buildings, etc.
- Otis Electric Traction Elevators. Booklet. 9 x 12 in. 28 pp. Illustrated. Full details and illustrations of Otis geared and gearless traction elevators for all types of buildings.
- Otis Escalators. Booklet. 6 x 9 in. 36 pp. Illustrated. Description of step and cleat type single and double file escalators (moving stairways).

Sedgwick Machine Works, 151 West 15th Street, New York.
- Catalog and descriptive pamphlets. 4¼ x 8¼ in. 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.

FENCES

American Fence Construction Co., 106 Church Street, New York.
- Ateo Factory Fences. Booklet. 9 x 12 in. 32 pp. Illustrated.
- Residential Fences. Booklets. 7 x 2½ in. Illustrated. A series of booklets on residential fences consisting of photographs and brief descriptions.

Anchor Post Iron Works, 165 Broadway, New York, N. Y.
- Catalog 51. 8½ x 11 in. 53 pp. Illustrated. Anchor Post Fences for Country Place, Factory or Farm.
- Catalog 54. 8½ x 11 in. 24 pp. Illustrated. Factory Fences.

FIRE DOORS.—See Doors, Windows and Trim, Metal

FIREPLACE EQUIPMENT

Covert Co., H. W., 137 E. 46th Street, New York, N. Y.
- Hints on Fireplace Construction. Catalog. 5⅝ x 8½ in. 11 pp. Illustrated.
- Diagrams of construction and installation of Covert "Improved" and "Old Style" Dampers and Smoke Chambers.

FLOORING

Armstrong Cork & Insulation Co., 132 24th Street, Pittsburgh, Pa.
- Linotile Floors. Catalog. 6 x 9 in. 40 pp. Color plates. Describes Linotile, a composition of ground cork, wood flour, linseed oil and various gums and pigments in tile form.
- The Ten-Point Cork Floor. Booklet. 3½ x 6 in. 16 pp. Shows design panels in color for Cork Tile floors.

Armstrong Cork Co. (Linoleum Dept.), Lancaster, Pa.
- Armstong's Linoleum Floors. Catalog. 8½ x 11 in. 54 pp. Color plates. A technical treatise on linoleum, including tables and specifications for installing linoleum floors.
- The Artistic Possibilities of Armstrong's Linoleum Floors. Booklet. 11¼ x 16½ in. 12 pp. Color plates.
- Armstrong's Linoleum Pattern Book, 1920. Catalog. 3½ x 6 in. 176 pp. Color plates. Reproductions in color of all patterns of linoleum and cork carpet in the Armstrong line.
- Quality Sample Book. Three books. 3½ x 5¾ in. Showing all grades and thicknesses in the Armstrong line of linoleum and cork carpets.

An Independent Investigation

Of present and future conditions in the DWELLING and MODERATE COST BUILDING FIELDS

In Which *Your* Co-operation Is Asked

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CONDITIONS in the home-building field are puzzling. If we can get direct information from thousands of readers of the BUILDERS' JOURNAL, in accordance with the accompanying questions, we will be able to publish an analysis of this subject which will be of great value at this time and which should have a stimulating influence that may directly benefit you.

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Sincerely,

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The Builders' Journal,
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(Kindly check (x) box)

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SPECULATIVE BUILDER . ( )
ARCHITECT . . . . ( )
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LOANING ON MORTGAGE . . ( )
PROSPECTIVE HOME OWNER ( )
MATERIAL MANUFACTURER ( )
MATERIAL DEALER . . ( )

If your interest is not classified above, fill in this blank line

Kindly fill in your answers — *information confidential*

1. Do you anticipate activity in home and moderate cost building in your locality in 1921?

2. Is it difficult to obtain building loan and mortgage money locally?

3. Is there a dwelling shortage in your locality?

4. If building is "slow" — why? (local reasons)

Kindly fill out answers and mail to
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Address

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PLACE RULER ON THIS LINE AND TEAR OFF PAGE

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 54*

FLOORING —Continued

Muller Co., Franklyn R., Waukegan, Ill.
Asbestone Composition Flooring. Circulars. 8½ x 11 in. Description and Specifications.

Oak Flooring Manufacturers Association, 1014 Ashland Block, Chicago, Ill.
Modern Oak Floors. Booklet. 6¾ x 9¼ in. 24 pp. Illustrated. A general book that tells the complete story on Oak Flooring.
Oak Flooring, How and When to Use It. Booklet. 3½ x 6¼ in. 16 pp. Illustrated. A small, technical book showing the general rules, standard thickness and widths, how to lay, finish and care for oak floors.

FLOOR HARDENERS

Anti-Hydro Waterproofing Co., 299 Broadway, New York
Floor Hardening. Circular. 6½ x 8½ in. 4 pp. Describes an inexpensive method for producing permanently smooth, dustless and wearproof floors.

General Chemical Company, The, 25 Broad Street, New York, N. Y.
Hard-N-Tyte for concrete and mortars. Booklet. 3½ x 8½ in. 8 pp. Illustrated. Describes use of Hard-N-Tyte as application for hardening concrete floors.

Sonneborn Sons, Inc., L., 266 Pearl Street, New York.
Concrete and Lapidolith. Booklet. 5 x 8½ in. 24 pp. Illustrated. Describing relation of Lapidolith chemical floor hardener to concrete construction.
Why Lapidolize? Booklet. 8½ x 11 in. 11 pp. Illustrated. Reasons why Lapidolith should be specified.
Lapidolith Specifications. Circular. 8½ x 10¾ in. 2 pp.

Truscon Laboratories, The, Cor. Caniff Avenue and Grand Trunk R. R., Detroit, Mich.
Agatex and Its Performances. Booklet. 8½ x 11 in. Describes the methods of hardening concrete floors by the application of a chemical which forms a new surface as hard as agate.

FURNACES—See Heating Equipment

FURNITURE

Leavens Co., Inc., The William, 32 Canal Street, Boston, Mass.
Catalog. 7 x 9 in. 200 loose leaved pp. Illustrated with wood cuts.

GARAGE CONSTRUCTION

Ramp Buildings Corporation, 50 Church Street, New York, N. Y.
The d'Humy Motoramp System of Building Design. Booklet. 8½ x 11 in. 20 pp. Illustrated. Describing the d'Humy system of ramp construction for garages, service buildings, factories, warehouses, etc., where it is desirable to drive automobiles and motor trucks or industrial tractors under their own power from floor to floor.

GLASS CONSTRUCTION

King Construction Company, N. Tonawanda, N. Y.
Catalog No. 52. 9 x 11 in. 45 pp. Illustrated. Illustrating and describing greenhouses erected for private estates and public parks.

Mississippi Wire Glass, 220 Fifth Avenue, New York.
Mississippi Wire Glass. Catalog. 7½ x 9½ in. 32 pp. Illustrated. Covers the complete line.

GRANITE—See Stone, Building

HARDWARE

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet. 4 x 9¼ in. 8 pp. Illustrated.

McKinney Mfg. Co., Pittsburgh, Pa.
McKinney Cabinet Hardware. Catalog. 6 x 9 in. 32 pp. Illustrated. Describes complete line of hardware for cabinet and furniture work.
McKinney Hardware for Sliding Doors. Booklet. 6 x 9 in. 18 pp. Illustrated. Describes different types of sliding door hardware.

Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Catalog No. 10. 6¼ x 9 in. 42 pp. Illustrated. Covers a complete line of chains, hardware and specialties.

Stanley Works, The, New Britain, Conn.
Wrought Hardware. Catalog. BJ10. 6½ x 10 in. Color plates. Shows all of the Stanley Works products made of steel from their own mills.
Eight Garages and their Stanley Garage Hardware. Booklet. 5 x 6¾ in. 32 pp. Illustrated. Illustrations and floor plans of eight typical garages that have been correctly equipped with Stanley Garage Hardware.
Ball Bearing Butts. Booklet. B8. 5 x 7¼ in. 32 pp. Illustrated. Concise description of various butts manufactured.
Stanley Specially Designed Garage Hardware. Booklet. B-50. 6 x 9 in. 24 pp. Illustrated. Detailed pictures and descriptions of various garage hardware equipment.

Vonnegut Hardware Co., Indianapolis, Ind.
Von Duprin Self-Releasing Fire Exit Devices. Catalog. 12F. 8 x 11 in. 41 pp. Illustrated.
"Safety Lives." Booklet. 5½ x 6¾ in. 16 pp. Illustrated. Cabinet outline why Self-Releasing Fire Exit Devices should be used.

HEATING EQUIPMENT

James B. Clow & Sons, 534 S. Franklin Street, Chicago, Ill.
Gasteam. Catalog. 6 x 9 in. 16 pp. Illustrated. New radiator valve for use.

Abram Cox, American & Dauphin Street, Philadelphia, Pa.
Catalog 73. 9 x 12 in. 40 pp. Illustrated. Covers the complete line.
Industrial Housing. Circular. 8 x 10½ in. 12 pp. Illustrated. Modern industrial housing projects with specifications for heating equipment.
Smokeless Boiler Circular. 8 x 10½ in. 8 pp. Detailed description of the Novelty Smokeless Boiler—The boiler with the carburetor.

Gorton & Lidgerwood Co., 96 Liberty Street, New York.
Gorton Self Feeding Boilers. Booklet. 4¼ x 7¼ in. 32 pp. Illustrated. Descriptions, specifications and prices.

Graver Corporation, East Chicago, Ind.
Hot Water Service Heaters. Booklet. 8½ x 11 in. 4 pp. Illustrated. Describing Graver vertical and horizontal service heaters which utilize exhaust steam for heating.

HEATING EQUIPMENT—Continued

Kelly Controller Co., 175 W. Jackson Blvd., Chicago, Ill.
The Kelly Low Pressure Controller. Booklet. 4 x 9 in. 22 pp. Illustrated. Describing what The Kelly Controller accomplishes, its mechanical operation, and its application.

Kewanee Boiler Co., Kewanee, Ill.
Kewanee on the Job. Catalog. 8½ x 11 in. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 73. 6 x 9 in. 35 pp. Illustrated. Describes Kewanee steel power boilers with complete specifications.
Catalog No. 74. 6 x 9 in. 35 pp. Illustrated. Describes Kewanee steel heating boilers with specifications.
Catalog No. 75. 8½ x 11 in. 6 pp. Illustrated. Specifications on Tabasco Water Heaters, Kewanee water heating garbage burners and Kewanee steel tanks.

Minneapolis Heat Regulator Company, Minneapolis, Minn.
The Heart of the Heating Plant. Catalog. 6 x 9 in. 20 pp. Illustrated. Describing the Minneapolis Heat Regulator, its construction, application and operation for the automatic control of temperature where coal, gas, fuel oil or street steam is used.

Page Boiler Company, The Wm. H., 141 West 36th Street, New York, N. Y.
Page Boilers. Catalog. 4½ x 8 in. 84 pp. Illustrated. Descriptions with specifications of the Volunteer Round and Monarch Square Sectional Boilers, also the Monarch Down-Draftless Smokeless Boiler: with method for apportioning size of boiler and radiation, and other heating data.

Riverside Boiler Works, Cambridge, Mass.
Riverside Range Boilers and Tanks. Catalog. 6 x 3 in. 35 pp. Illustrated. Shows sizes regularly manufactured, methods of installation and descriptions of processes used in manufacturing.

Smith Co., H. B., 57 Main Street, Westfield, Mass.
General Boiler and Radiator Catalog. 4 x 7 in. 90 pp. Illustrated. Giving ratings, dimensions, capacities and working pressures.
Engineer's Data Ring Book. 4 x 7 in. 125 pp. Illustrated.
Architect's and Contractor's Binders. These binders are made up of 9½ x 11 in. folders of different kinds giving dimensions, price lists, and erecting directions on the different lines of our manufacture.

Utica Heater Co., Utica, N. Y.
Imperial Boilers & Heating Supplies. Catalog. 8½ x 6¾ in. 52 pp. Illustrated.
Imperial Super Smokeless Boilers. Loose leaf catalog. 8½ x 11 in. 24 pp.
Superior Warm Air Furnaces. Catalog. 4½ x 8 in. 36 pp. Illustrated.
New Idea Pipeless Furnaces. Circular. 8½ x 11 in. 4 pp. Illustrated.

HEAT REGULATORS—See Heating Equipment

HOISTS

Gillis & Geoghegan, 344 West Broadway, New York.
Hoists for Industrial Plants. Booklet. 6 x 8¾ in. 8 pp. Illustrated. Labor saving service in the lifting or lowering of lighter loads, through the use of G. & G. Telescopic and Non-telescopic Hoists.
Removing Ashes. Booklet. 6 x 8¾ in. 6 pp. Illustrated. Removing ashes from boiler room directly to wagon by electrically operated Telescopic Hoists.

HOLLOW TILE—See Tile, Hollow

INSULATION

Bishopric Mfg. Company, 103 Este Avenue, Cincinnati, Ohio.
Homes Built on the Western Plan of Ages. Catalog. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric Stucco-Board and Bishopric Sheathing Board.

Philip Carey Co., The, Cincinnati, Ohio.
Carey Asbestos and Magnesia Products. Catalog. 6 x 9 in. 72 pp. Illustrated.

JOISTS AND STUDS, PRESSED STEEL

Truscon Steel Co., Youngstown, Ohio.
Truscon Standard Buildings. 4th ed. Catalog. 8½ x 11 in. 40 pp. Illustrated. Erection details, cross-section diagrams and adaptations are given.
Truscon Structural Pressed Steel. Catalog. 8½ x 11 in. 24 pp. Illustrated. Information on Pressed Steel Beams and Joists for light occupancy buildings. Tables, specifications and views of installations.

LATH, METAL AND REINFORCING

The Bostwick Steel Lath Co., Niles, Ohio.
Bostwick Steel Lath, Revised Edition 1920. Catalog. 9 x 11½ in. 28 pp. Illustrated. Covers the entire line. Drawings and Specifications.

Corrugated Bar Company, Inc., Buffalo, N. Y.
Corr-Mesh. Catalog. 6 x 9 in. Illustrated. Describes the characteristics of Corr-Mesh, a ribbed expanded metal used in concrete and stucco construction.
Corr-Plate. Catalog. 6 x 9 in. 63 pp. Illustrated. Describes a type of girderless floor construction in which the reinforcing bars are laid in two directions only.

North Western Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
Designing Data. Catalog. 6 x 9 in. 94 pp. Illustrated. Describes most efficient use of Econo Expanded Metal Reinforcing.
Formless Concrete Construction. Catalog. 6 x 9 in. 80 pp. Illustrated. Describes use of T-Rib Chanelath, a form and reinforcing for concrete.

Truscon Steel Co., Youngstown, Ohio.
Hy-Rib and Metal Lath. 18th ed. Catalog. 8½ x 11 in. 64 pp. Illustrated. Gives properties of laths, specifications, special uses and views of installations.

LUMBER

American Walnut Mfrs. Assoc., Rm. 1000, 616 S. Michigan Blvd., Chicago, Ill.
American Walnut, the Choice of the Master Craftsman. Booklet. 7 x 9 in. 45 pp. Illustrated. The use of walnut in fine furniture and woodwork.
Specification Notes for American Walnut Interior Trim. 8½ x 11 in. 3 pp. Includes notes on the different styles of finish suitable for walnut.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 56*

LUMBER—Continued

Long Bell Lumber Co., R. A. Long Building, Kansas City, Mo.
The Post Everlasting Booklet 10½ x 7½ in. 32 pp. Illustrated. Information regarding creosoted yellow pine fence posts, barn poles, paving blocks, etc.
Poles That Resist Decay Booklet 9¼ x 4 in. 16 pp. Illustrated. Poles for telegraph, telephone, high power transmission lines.

METAL LATH—See Lath, Metal and Reinforcing

METALS

American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.
Reference Book Pocket Ed. 2½ x 4½ in. 168 pp. Illustrated. Covers the complete line of Sheet and Tin Mill Products.
Copper—Its Effect Upon Steel for Roofing Tin. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes the merits of high grade roofing tin plates and the advantages of the copper-steel alloy.
Apollo and Apollo-Keystone Galvanized Sheets. Catalog. 8½ x 11 in. 20 pp. Illustrated.
Research on the Corrosion Resistance of Copper Steel. Booklet. 8½ x 11 in. 24 pp. Illustrated. Technical information on results of atmospheric corrosion tests of various sheets under actual weather conditions.
Facts Simply and Briefly Told. Booklet. 8½ x 11 in. 16 pp. Illustrated. Non-technical statements relating to Keystone Copper Steel.
Black Sheets and Special Sheets. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes standard grades of Black and Uncoated Sheets, together with weights, bundling tables, etc.
Bright Tin Plates. Catalog. 8½ x 11 in. 16 pp.

International Nickel Company, 43 Exchange Place, New York, N. Y.
Pamphlet. 3½ x 6 in. 8 pp. Illustrated. Describing the wire strength and durability of Monel Screens.

METAL TRIM—See Doors, Windows and Trim, Metal

MORTAR COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Booklet. 3½ x 6¾ in. 8 pp. Illustrated. Complete description of Clinton Mortar Colors with color samples.

OFFICE SUPPLIES

Dixon Crucible Co., Joseph, Pencil Dept., 224 J. Jersey City, N. J.
Finding Your Pencil. Booklet. 6¼ x 3¼ in. 16 pp. Illustrated.
The First Five. Booklet. 3½ x 5¼ in. 10 pp. Illustrated.
A Study in Sepia. Booklet. 7 x 4½ in. 5 pp. Illustrated.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Berry Brothers, Detroit, Michigan.
"Natural Woods and How to Finish Them." Booklet. 6½ x 4¾ in. 95 pp. Containing technical information and advice concerning wood finishing.
"Beautiful Homes." Booklet. 8½ x 6½ in. 26 pp. Illustrated in colors. Giving information to home builders and others on interior finishing.

Boston Varnish Co., Everett Station, Boston, Mass.
The Inviting Home. Booklet. 5½ x 9 in. 16 pp. Color Plates. A briefly worded book on painting for the busy architect or decorator.
The White Enamel Specification Book. 6 x 9 in. 12 pp. Explaining the use of Kyanize White Enamel on interior or exterior surfaces.

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Creosote Stains. Booklet. 4 x 8½ in. 16 pp. Illustrated.

Creo-Dipt Company, Inc., 1025 Oliver St., Tonawanda, N. Y.
Dixie White Folder. 3½ x 8 in. 3 pp. Illustrated. A heavy white stain which produces the whitewashed effect.

Devoe & Raynolds Co., Inc., 101 Fulton Street, New York.
Architectural Finishes. Catalog. 5 x 7 in. 40 pp. Specifications and suggestions for painting, varnishing, staining and enameling.

Eagle-Picher Lead Co., The, 208 S. La Salle Street, Chicago, Ill.
Protective Coatings for Structural Metals. Book. 6 x 9 in. 48 pp. Illustrated.

Fox Co., M. Ewing, New York, N. Y.
Calcimines. Booklet. 3¼ x 6¼ in. 8 pp. Color cards.

O'Brien Varnish Co., 1121 Washington Avenue, South Bend, Ind.
That Magic Thing Called Color. Booklet. 5½ x 8½ in. 24 pp. Illustrated. Short treatise on the use of color in the home, special reference to walls and ceilings.
Architects' Specification Manual. 8½ x 11 in. 50 pp. Complete specifications for all paint products.

The Sherwin-Williams Co., 882 Canal Road, Cleveland, Ohio.
A Book of Painting and Varnishing Specifications. 8½ x 11 in. 30 pp. A text book on painting and finishing.
Announcement of Sherwin-Williams Flat-Tone Multi-Color Effects. Booklet. 2½ x 6 in. 10 pp. Illustrated. Development of a new system of wall decoration.
Monthly Architectural Bulletin. 8½ x 11 in. Bulletin issued periodically on painting and finishing.

Smith & Co., Edward, P. O. Box 76, City Hall Station, New York, N. Y.
Architect's Hand Book. 4¾ x 7½ in. 24 pp. Specifications and suggestions for painting, varnishing, enameling, etc.

Sonneborn Sons, Inc., L., Dept. 4, 264 Pearl Street, New York.
Paint Specifications. Booklet. 8½ x 10¾ in. 4 pp.

The Standard Paint Company, 95 Madison Avenue, New York, N. Y.
Preservative Coatings. Booklet. 6 x 9 in. 15 pp. Illustrated. Presents in a concise manner the properties and uses of the Standard Paint Company's various paint preparations.

Truscon Laboratories, The, Cor. Caniff Avenue and Grand Trunk R. R., Detroit, Mich.
Spread the Sunshine Inside. Booklet. 5 x 8 in. 24 pp. Describes methods for light saving by the application of light reflecting enamels to interior walls of factories and workrooms.

Wadsworth-Howland Co., Inc., Boston, Mass.
Paints and Varnishes. Catalog. 5¾ x 8½ in. 140 pp. Illustrated. Covers the complete line.

PIPE

Clow & Sons, James B., 534 S. Franklin Street, Chicago, Ill.
Catalog "A." 4 x 6½ in. 706 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

PIPE—Continued

National Tube Co., Frick Building, Pittsburgh, Pa.
National Bulletin No. 11, History, Characteristics and Advantages of National Pipe. Catalog. 8½ x 11 in. 48 pp. Illustrated.

PLUMBING EQUIPMENT

Brunswick-Balke-Collender Co., 623 S. Wabash Avenue, Chicago, Ill.
Whale-bone-ite Seat. Booklet. 3½ x 6¼ in. 4 pp. Illustrated.
Whale-bone-ite Seat. Booklet. 3½ x 6¼ in. 8 pp. Illustrated.

Clow & Sons, James B., 534 S. Franklin Street, Chicago, Ill.
Catalog "M." 9¼ x 12 in. 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Crane Company, 836 S. Michigan Avenue, Chicago, Ill.
Crane Products in World Wide Use. Catalog. 5 x 9½ in. 24 pp. Illustrated.
Plumbing Suggestions for Home Builders. Catalog. 3 x 6 in. 80 pp. Illustrated.
Plumbing Suggestions for Industrial Plants. Catalog. 4 x 6½ in. 43 pp. Illustrated.

Eagle-Picher Lead Co., The, 208 S. LaSalle Street, Chicago, Ill.
Plumbers' Lead Guide. Catalog. 4⅞ x 7¾ in. 52 pp. Illustrated.

Kohler Co., Kohler, Wis.
Kohler of Kohler. 5½ x 8 in. 48 pp. Illustrated catalog. Shows complete line of plumbing fixtures.
Kohler Architect Specification Forms. 8½ x 11 in. Loose leaf portfolios intended to cover individual specifications. Separate illustrations and specification sheets provided.

Maddock's Sons Co., Thomas, Trenton, N. J.
Highest Grade Standardized Plumbing Fixtures for Every Need. Catalog. 5 x 7½ in. 94 pp. Illustrated. Covers the complete line.
Bathroom Individuality. Booklet. 6 x 9 in. 28 pp. Illustrated. Showing view of complete bathrooms with complete descriptions of floor plans.
Specifications for plumbing fixtures. Booklet. 9 x 12 in. 8 pp. Tables of specifications for industrial buildings, schools, apartments, hotels, etc.

Speakman Company, Wilmington, Del.
Speakman Showers and Fixtures. Catalog. 4½ x 7½ in. 250 pp. Illustrated. Catalog of Modern Showers and Brass Plumbing Fixtures, with drawings showing layouts, measurements, etc.
Toned Up In Ten Minutes. Booklet. 7½ x 10½ in. 16 pp. Illustrated. Modern Showers and Washups for Industrial Plants, showing the sanitary method of washing in running water.

PUMPS

Goulds Mfg. Co., The, Seneca Falls, N. Y.
Set of Twenty Bulletins. 7½ x 10⅝ in. 12 to 32 pp. each. Illustrated. Covers complete line of power and centrifugal pumps for all services.
Catalog "K." 6 x 9 in. 216 pp. Illustrated. Covers complete line of smaller size pumps.

REFRIGERATION

Johns-Manville Co., The H. W., Madison Avenue and 41st Street, New York, N. Y.
Johns-Manville System of Refrigeration. Booklet. 3½ x 6 in. 16 pp. Illustrated.

ROOFING

Philip Carey Co., The, Cincinnati, Ohio.
Architects Specifications for Carey Building Material. 8½ x 11 in. 48 pp. Illustrated.

Johns-Manville Co., The H. W., Madison Avenue and 41st Street, New York.
Johns-Manville Asbestos Shingles. Booklet. 3⅓ x 6 in. 32 pp. Illustrated. Prices, construction date and specifications.
Johns-Manville Roofing and Building Materials. Catalog. 3½ x 6 in. 24 pp. Illustrated. Describes building materials such as asbestos wood, sound deadening and insulating felts, waterproofing, etc.

Keasbey & Mattison Co., Ambler, Pa.
Ambler Asbestos Shingles. Catalog. 5½ x 8½ in. 40 pp. Illustrated.
Ambler Asbestos Corrugated Roofing and Siding. Catalog. 8½ x 11 in. 36 pp. Illustrated. Standard Purlin Spacing Tables.
Ambler Asbestos Corrugated Roofing and Siding. Catalog. 8½ x 11 in. 20 pp. Illustrated. Prices and specifications.
Ambler Asbestos Building Lumber. Catalog. 8½ x 11 in. 32 pp. Illustrated.

The Standard Paint Company, 95 Madison Avenue, New York, N. Y.
Instructions for Laying Built-up Roofs. Booklet. 8½ x 11 in. Illustrated.

Standard Paint Company, 95 Madison Avenue, New York, N. Y.
Roofing Facts Worth Knowing. Booklet. 6 x 9 in. 16 pp. Illustrated.

N. & G. Taylor Company, 300 Chestnut Street, Philadelphia, Pa.
Selling Arguments for Tin Roofing. Booklet. 6¼ x 9¼ in. 80 pp. Illustrated. Describes the various advantages of the use of high grade roofing tin, gives standard specifications, general instructions for the use of roofing tin, illustrates in detail methods of application.
No. 1 of Nolan's Series of Standard Specification Forms and Condensed Descriptions. Leaflet. 8½ x 11 in. 12 pp. Standard forms and details for specifications of building construction arranged for permanent filing and reference. This is No. 1 of the series, giving technical information on tin roofing, for the use of architects, engineers and builders.
Roof Designs. Booklet. 8½ x 11 in. 16 pp. Illustrated. Presenting some of the merits of tin as a roofing material.
Service Sheets. Set of four. Illustrated. Large size working drawings, detailing various methods of applying tin roofing, also valleys, gutters, flashings, also heavy ribbed roofing, domes, etc.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 58*

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¼ x 10½ in. 46 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal system.

SHEATHING

Bishopric Mfg. Company, 103 Este Ave., Cincinnati, Ohio.
Homes Built on the Wisdom of Ages. Catalog. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric Stucco-Board and Bishopric Sheathing Board.

STONE, BUILDING

Harrison Granite Company, 200 Fifth Avenue, New York, N. Y.
Harrison Granite Company, Chronicle. 3½ x 5½ in. 24 pp. Illustrated. A partial list of clients with illustrations of examples of monuments and mausoleums.

Indiana Limestone Quarrymen's Association, Box 766, Bedford, Indiana.
Vol. 1. Indiana Limestone Library. 6 x 9 in. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Vol. 4. Indiana Limestone Bank Book. 6 x 9 in. 48 pp. Illustrated. Descriptive of the use of Indiana Limestone for bank buildings, with partial list of buildings in which it has been used.
Vol. 27. Designs for Houses of Indiana Limestone. 8½ x 11 in. 32 pp. Illustrated. Being the best designs submitted in competition for a detached residence faced with Indiana Limestone conducted by *The Architectural Review.*

National Building Granite Quarries Association, Inc., 31 State St., Boston, Mass.
Booklet. 8½ x 11 in. 16 pp. Illustrated. Contains nineteen color plates of standard American Building Granites; specifications; classification listing colors, textures, and producers; detail sheets illustrating relative value of mouldings, economical design and typical construction; a general description of granite including uses, finishes, tests, etc.

STORE FRONTS

Kawneer Co., The, Niles, Mich.
Kawneer Solid Copper Store Fronts. Catalog "K." 8½ x 11 in. 32 pp. Illustrated. Information about various members used in the pioneer Kawneer construction.
A Collection of Successful Designs. Catalog. 9¼ x 6½ in. 64 pp. Illustrated. Showing by use of drawings and photographs many types of Kawneer Solid Copper Store Fronts.

Zouri Drawn Metals Co., B. J. 10, Chicago Heights, Ill.
Architects' Catalog. 8¾ x 11¾ in. 86 pp. Illustrated. Showing a true copy of the approval of the Underwriters' Laboratories. Showing a proper glazing specification, based on the Underwriters' Report.
Catalog B J 8. 6 x 9 in. 68 pp. Illustrated. Key to Getting the People In.

STUCCO, MAGNESITE

Muller, Franklyn R. Co., Waukegan, Ill.
Everlastic Magnesite Stucco. Booklet. 8½ x 11 in.

STUCCO BASES

Bishopric Manufacturing Co., 103 Este Avenue, Cincinnati, Ohio.
Homes Built on the Wisdom of Ages. Catalog. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric stucco board and Bishopric sheathing board.

TERRA COTTA

Atlantic Terra Cotta Co., 1170 Broadway, New York, N. Y.
Questions Answered. Booklet. 7½ x 5¼ in. 32 pp. Illustrated.

National Terra Cotta Society, 1 Madison Avenue, New York, N. Y.
Standard Construction, Indexed, bound volume. 10½ x 16 in. 90 pp. 70 Illustrations. Standard forms of terra cotta construction with short article.
"The School." 10½ x 13½ in. 34 pp. 92 Illustrations. Types of school buildings with short descriptive articles. Volume I, brochure series.
"The Theatre." 10½ x 13½ in. 36 pp. 102 Illustrations. Types of theatre buildings with short descriptive articles. Volume II, brochure series.
"The Store." 10½ x 13½ in. 34 pp. 60 Illustrations. Types of store buildings with short descriptive articles. Volume III, brochure series.

Northwestern Terra Cotta Co., The, 2525 Clybourn Ave., Chicago, Ill.
Booklet. 8¼ x 11 in. 77 pp. Illustrated. Showing in a concise way the usefulness of terra cotta.

THERMOSTATS.—See Heating Equipment

TILE, FLOOR AND WALL

Associated Tile Manufacturers, The, Beaver Falls, Pa.
Bring the Crowds to Your Market. Booklet. 8½ x 11 in. 16 pp. Illustrated. The use of Tile for the modern sanitary market.
Swimming Pools. Booklet. 8½ x 11 in. 32 pp. Illustrated. A handbook on swimming pools and their construction.

TILE, HOLLOW

Hollow Building Tile Association, Dept. 1812, Conway Bldg., Chicago, Ill.
Handbook of Hollow Building Tile Construction. 8½ x 11 in. 104 pp. Illustrated. Complete treatise on most approved methods of hollow tile building construction and fireproofing.

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Wall Construction Bulletin 174. 8½ x 11 in. 32 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
Industrial Housing Bulletin 172. 8½ x 11 in. 14 pp. Illustrated. Photographs and floor plans of typical workingmen's homes.
Natco on the Farm. 8½ x 11 in. 38 pp. Illustrated. A treatise on the subject of fire safe and permanent farm building construction.
Fireproof Buildings of Natco Hollow Tile. Booklet 8½ x 11 in. 16 pp. Illustrated. Showing the use of Natco Hollow Tile for private residences.

VALVES

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
No. 50 Steam Pocket Catalog. 4 x 6½ in. 775 pp. Illustrated. Describes the complete line of the Crane Co.

Jenkins Bros., 80 White Street, New York.
The Valve Behind a Good Heating System. Booklet. 4½ x 7¼ in. 16 pp. Color plates.
Jenkins Valves for Plumbing Service. Booklet. 4½ x 7¼ in. 16 pp. Illustrated.

VENTILATION

Globe Ventilator Co., Dept. P., Troy, N. Y.
Globe Ventilator's Catalog. 6 x 9 in. 32 pp. Illustrated.

WALL BOARDS

Carey Co., The Philip, Cincinnati, Ohio.
Carey Board for Better Building. Catalog. 6 x 9 in. 32 pp. Illustrated.

WATERPROOFING

Anti-Hydro Waterproofing Co., 299 Broadway, N. Y.
Waterproofing. Booklet. 3½ x 6 in. 4 pp. Methods used for waterproofing concrete and mortars.

Minwax Company, Inc., 18 East 41st Street, New York, N. Y.
Waterproofing Exposed Walls. Bulletin No. 22. 8½ x 10 in. 12 pp. Illustrated. Descriptions and specifications dealing with two methods of dampproofing above grade walls, viz., Minwax clear waterproofing or Minwax brick and cement coating, and Minwax asphaltic dampproofing No. 300.
Products Bulletin. 8½ x 5½ in. 24 pp. Illustrated with drawings. Condensed catalog of Minwax products for standardized structural protection.

Sandusky Cement Co., Dept. F, Cleveland, Ohio.
Medusa Waterproofing. Booklet. 6¾ x 9 in. 37 pp. Illustrated.

Standard Paint Company, The, 95 Madison Ave., N.Y.
Impervite. Circular. 8½ x 11 in. 4 pp. Illustrated. An integral waterproofing compound for concrete, stucco, cement, mortar, etc.

Toch Brothers, 320 Fifth Ave., New York, N. Y.
Toxement. Booklet. 5¼ x 8½ in. Illustrated. 24 pp. Describes Toxement, an integral waterproofing compound for concrete, stucco, cement, mortar, etc.

Truscon Laboratories, The, Cor. Caniff Avenue and Grand Trunk R. R., Detroit, Mich.
Structural Waterproofing. Handbook. 8½ x 11 in. 100 pp. Illustrated. A reliable and trustworthy text-book on modern waterproofing practice.

WATER SOFTENERS

Graver Corp., East Chicago, Ind.
Graver Zeolite Softeners. Bulletin 509. 8½ x 11 in. 16 pp. Illustrated. Water softeners for homes, institutions, hotels, apartments, etc.
Graver Small Continuous Water Softener. Bulletin 507. 8½ x 11 in. 12 pp. Illustrated. A softener for raw water ice plants and small steam power plants.

Permutit Company, The, 440 Fourth Ave., New York, N. Y.
Permutit-Water softened to No (Zero) Hardness. Booklet. 8½ x 11 in. 32 pp. Describing the original Zeolite process of softening water to zero hardness. An essential for homes, hotels, apartment houses, swimming pools, laundries, textile mills, paper mills, ice plants, etc., in hard water districts.

WATER SYSTEMS

Graver Corporation, East Chicago, Ind.
Graver Vertical Pressure Water Feeders. Bulletin 502. 8½ x 11 in. 8 pp. Illustrated. Detailed description of parts, capacities and dimensions.

WINDOW HARDWARE

Samson Cordage Works, Boston, Mass.
Catalog. 3½ x 6¼ in. 24 pp. Illustrated. Covers complete line.

L. P. T. Specialty Co., Madison Terminal Bldg., Chicago, Ill.
Details and Specifications for Counter Balanced Window Hardware. 8½ x 11 in. Illustrated with drawings and blue prints.

WINDOWS, CASEMENT

Crittall Casement Window Co., 2703 East Atwater Street, Detroit, Mich.
Catalog No. 18. 9 x 12 in. 56 pp. Illustrated.

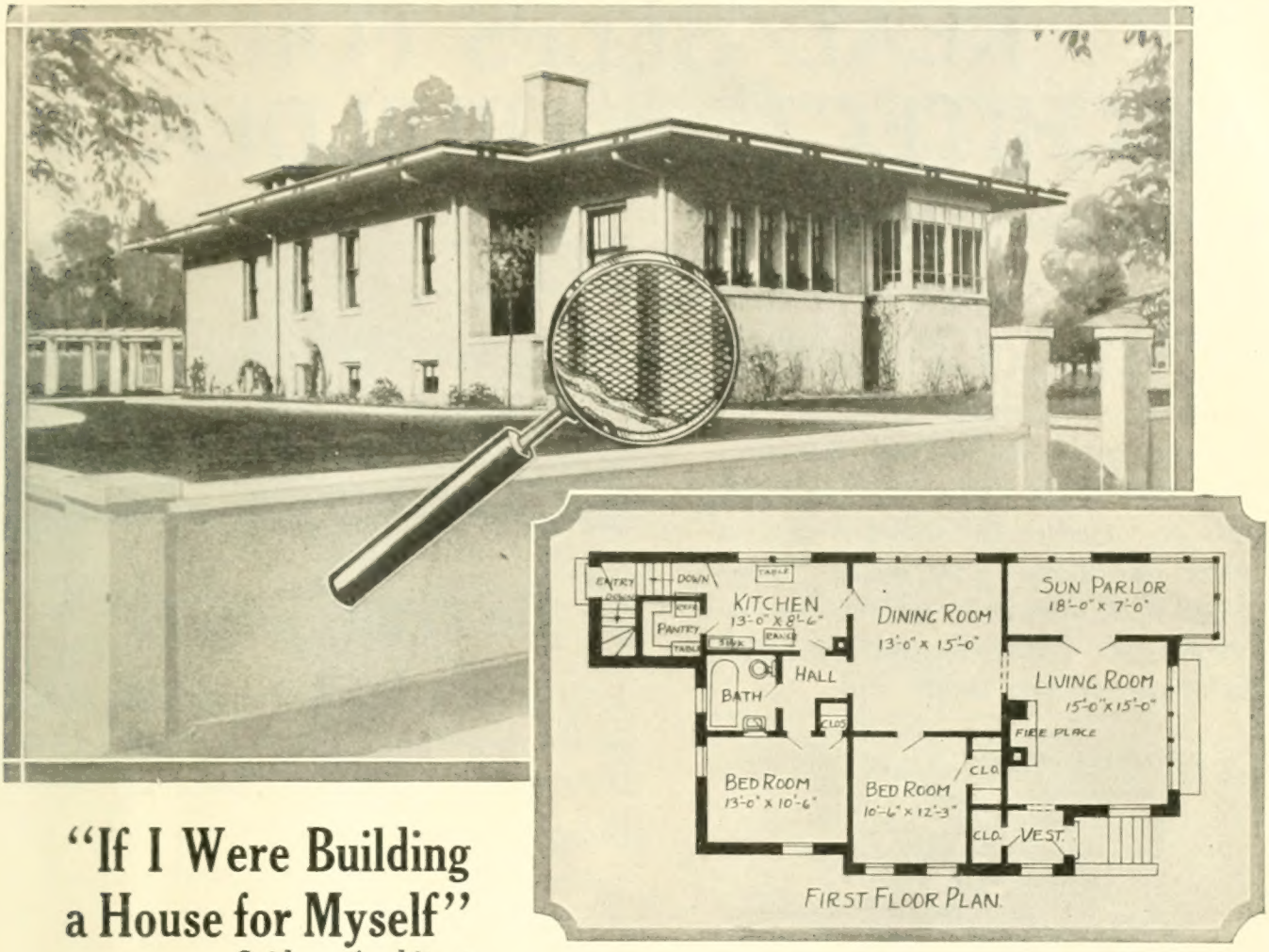
Detroit Steel Products Co., 2055 East Grand Bldg., Detroit, Mich.
Windowalls—Their Cost and Advantages. Catalog. 8¼ x 5½ in. 32 pp. Illustrated.

Hoffman Mfg. Co., Andrew, 900 Steger Building, Chicago, Ill.
Hoffman Casements. Architects' Portfolio. 8½ x 11 in. Loose-leaf. Large scale working details for mill-work and installation.
F. S. Details 20 x 23 in. and 15 x 22 in. Working details for mill-work and installation.
Hoffman Casements Catalog. 7 x 8½ in. 16 pp. Illustrated.

Hope & Sons, Henry, 103 Park Avenue, New York.
Catalog. 12¼ x 18½ in. 30 pp. Illustrated. Full size details of outward and inward opening casements.

International Casement Co., Inc., Jamestown, N. Y.
Casements for Banks and Public Buildings. Catalog. 8½ x 11 in. 24 pp. Illustrated. Shows construction of steel windows and surrounding masonry.

WOOD—See Lumber



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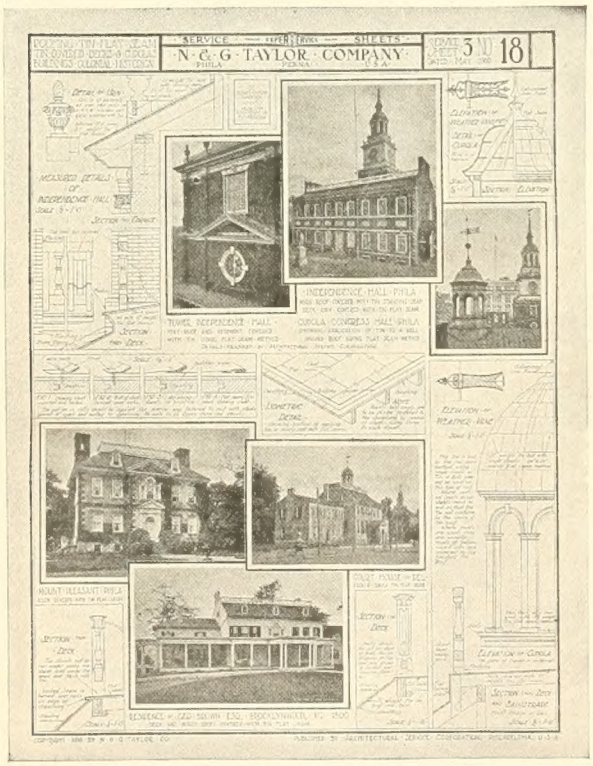

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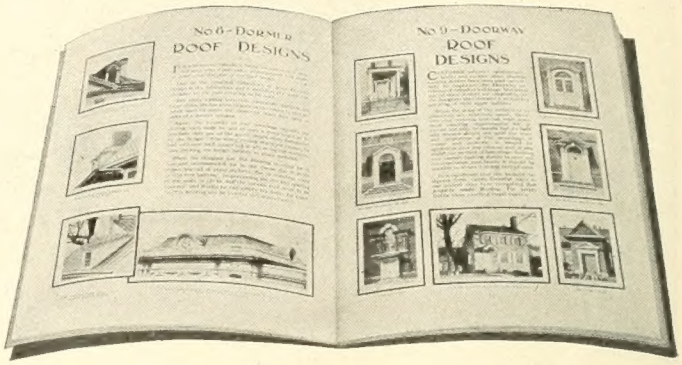

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NOTE — This is a reproduction, in miniature, of one of the four large detail Sheets described above.

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ALL along the Atlantic Coast there are summer resorts with miles and miles of boardwalk, trodden by millions of feet and drenched with surf and sea fog.

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America uses more wood per capita than any other country in the world.

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Far-reaching questions—make no mistake about that!

Detailed, scientific knowledge of the species of lumber, their characteristics and availabilities, means *durable* and *economical* building today.

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When you buy lumber for any purpose, no matter how much or how little, you can look at the mark and know that you are getting a standard article of known merit.

Weyerhaeuser Forest Products are distributed through the established trade channels by the Weyerhaeuser Sales Company, Spokane, Washington, with branch offices and representatives throughout the country.

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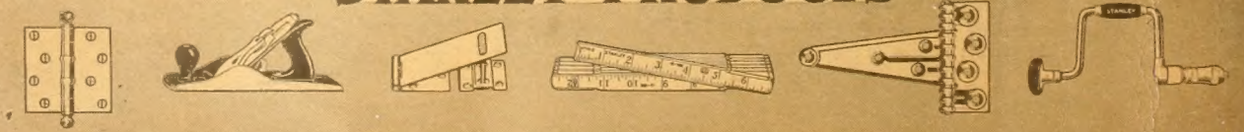

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